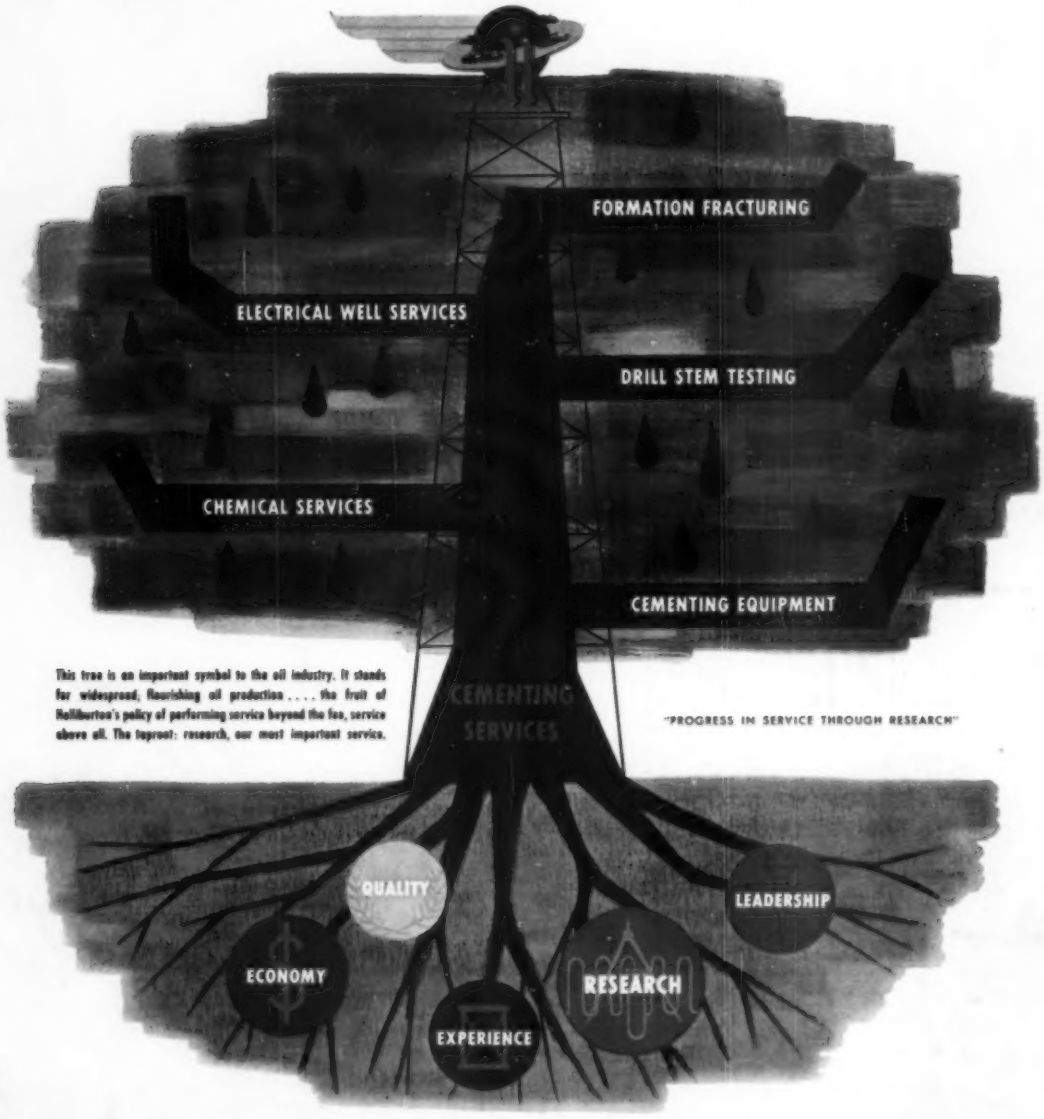
the Petroleum Engineer

FOR MANAGEMENT

REFERENCE EQUIPMENT ISSUE

INTEGRATED EDITION OF THE PETROLEUM ENGINEER

THE HALLIBURTON TREE OF SERVICE


FORMATION FRACTURING
ELECTRICAL WELL SERVICES
DRILL STEM TESTING
CHEMICAL SERVICES
CEMENTING EQUIPMENT
This tree is an important symbol to the oil industry. It stands for widespread, flourishing oil production . . . . the fruit of Halliburton's policy of performing service beyond the fee, service above all. The taproot: research, our most important service.
CEMENTING SERVICES
"PROGRESS IN SERVICE THROUGH RESEARCH"
QUALITY
LEADERSHIP
ECONOMY
RESEARCH
EXPERIENCE

HALLIBURTON OIL WELL CEMENTING COMPANY

DUNCAN, OKLAHOMA

Contents Pages 2 & 3 - Advertisers' Index Page 6 - REFERENCE EQUIPMENT ISSUE, 1956

Dowell engineers blend F.L.A. (Fluid Loss Additive) with the fracturing fluid in 10,000-gallon, skid-mounted paddle mixer.

New fluid loss control agent improves fracturing

F.L.A.* (Fluid Loss Additive), a petroleum derivative exclusive with Dowell, substantially lowers fluid loss when added to your fracturing medium. F.L.A. forms a film on the formation face to prevent fluid loss. This promotes longer fractures and deeper sand penetration. It means greater production and slower decline for your well.

Clean-up is fast, too. For F.L.A. is completely soluble in medium and low gravity crudes — only slightly less soluble in high gravity distillates or kerosene. You will find that water and acid have little or no effect on the fluid loss control properties of F.L.A. As a result, you can use it in wet crudes and water-oil or acid-oil emulsions. It requires no special equipment and can be mixed easily with either the sand or fracturing fluid.

Ask Dowell engineers to use F.L.A. in your next fracturing job. They'll tailor the treatment to fit the well giving you maximum control of fluid loss.

For more information or service, call any of the 165 Dowell offices in the United States and Canada; in Venezuela, contact United Oilwell Service. Or write Dowell Incorporated, Tulsa 1, Oklahoma, Dept. G-12.

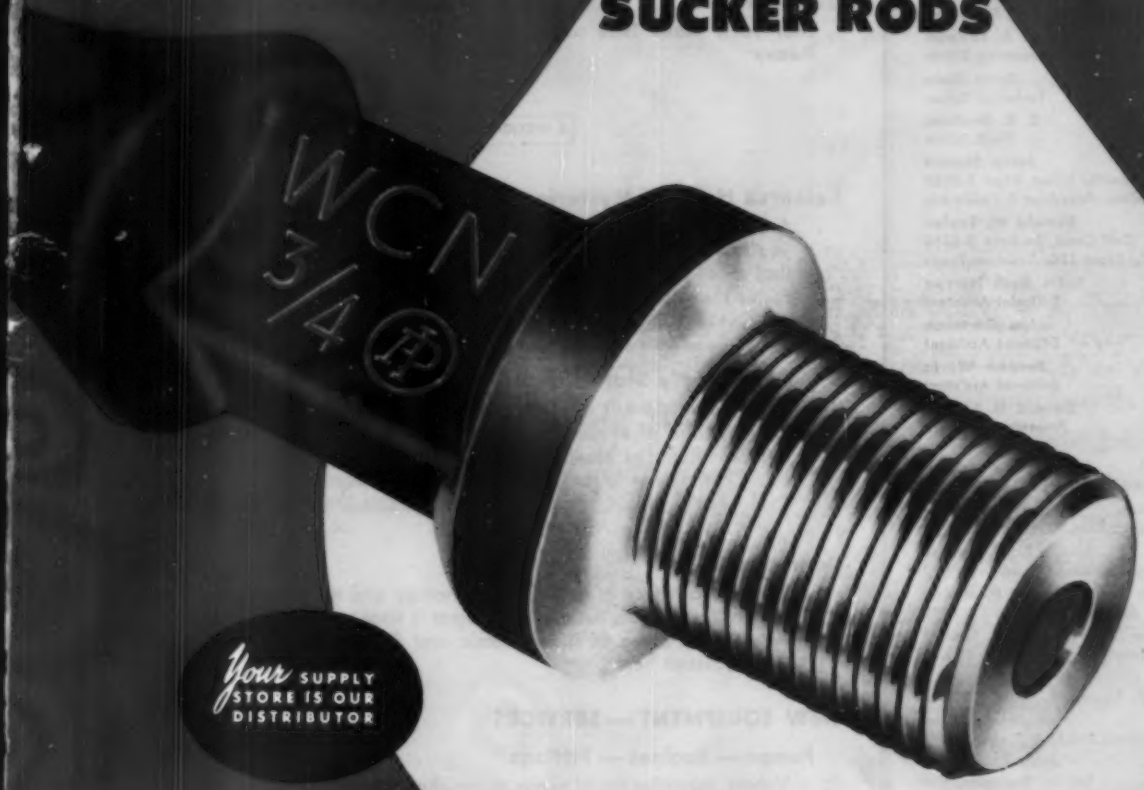
*Trademark of Dowell Incorporated.

services for the oil industry DOWELL

A SERVICE SUBSIDIARY OF THE DOW CHEMICAL COMPANY

If OIL is Your Business...

You Need NORRIS SUCKER RODS



Your SUPPLY STORE IS OUR DISTRIBUTOR

W.C. NORRIS MANUFACTURER, INC.

TULSA, OKLAHOMA

BRANCHES:

GREAT BEND, KANSAS; CORPUS CHRISTI, HOUSTON, KILGORE, ODESSA, WICHITA FALLS, TEXAS; OKLAHOMA CITY, OKLAHOMA; SALEM, ILLINOIS; CASPER, WYOMING.

Since NORRIS 1882

WEST COAST DIST. REPUBLIC SUPPLY CO. OF CALIF., LOS ANGELES

A Magazine of Petroleum Management

the Petroleum Engineer

FOR MANAGEMENT

NUMBER 8 VOLUME XXVIII JULY 15, 1956

Joe B. Weeds
President and Publisher
Abbott Sparks
Vice President and Advertising Director
Frank H. Love
Vice President and Editorial Director
L. H. Johnston
Secretary-Treasurer

•

Ernestine Adams
Management Editor
J. E. Kastrop
Editor, Drilling, Producing, and Exploration
Arch L. Foster
Editor, Refining, Petrochemical and Gas Processing
Frank H. Love
Editor, Oil, Gas, and Products Pipelining
James A. LeVelle
Engineering Editor
Dean Hale
Technical Editor
C. R. Graham
Field Editor
Jerry Stumm
Editor, Pacific Coast, RYan 1-5024
1011 S. Madison, Pasadena 5, California
Donald M. Taylor
Editor, Gulf Coast, JAckson 3-6346
2370 Rice Blvd., Room 110, Houston, Texas
Bette Ruth Horton
Editorial Assistant
Jan Gartman
Editorial Assistant
Jeanne Wertz
Editorial Assistant
Donald D. Fickert
Presentation Editor

•

Ed Sealey
Advertising Service Manager
NEW YORK— John Wallace
52 Vanderbilt Ave., MUrray Hill 6-7232
CHICAGO— E. V. Perkins
53 West Jackson Blvd., HArrison 7-6883
PASADENA— Richard P. McKey
465 East Union, RYan 1-8779
PITTSBURGH— William Faville
4525 McKnight Rd., WEllington 1-0619
HOUSTON— Roger Motheral
2370 Rice Blvd., Room 110, JAckson 3-6346
DALLAS— Jess Adkins
800 Davis Building, STerling 4404
John McDonald
Special Representative

•

Charles McKean
Circulation Director
Royal Courtney
Circulation Manager
Morris Hodges
Production Manager
Bobbie Robinson
Assistant Production Manager

Copyright 1956

The Petroleum Engineer Publishing Company
Indexed by Industrial Arts Index and
The Engineering Index, Inc.
Member of Audit Bureau of Circulation
and Associated Business Papers

The Petroleum Engineer for Management, published monthly, August through June, semi-monthly in July, by The Petroleum Engineer Publishing Company, 800 Davis Building, Dallas 2, Texas. Subscription rate to the Petroleum Industry, United States, Canada, and Foreign, $6.00 per year; $10.00 for 2 years; $13.00 for 3 years; $1.00 for single copy. Entered as second-class mail matter May 1, 1932, at the post office in Dallas, Texas, under the act of March 3, 1879.

Course of Oil A-4
Your Tools Make Time and Money

Advertisers Index A-6

E SECTION FOLLOWS A

Research Has Old Mysteries in a Spin! E-3
A kite or a kettle isn't enough any more . . . To be a scientist you have to be armed with fantastic tools — atomic "guns" that shoot nuclear particles, electronic "brains" that calculate faster than thought, microscopes that enlarge 100,000 times
—*Ernestine Adams*

What the Supply Store Can Do for You E-9
The modern store is the best point of contact between the oil industry and the supplier . . . It's an exposition of 10,000 different items of equipment, a clearinghouse of information . . . It contributes to the profitability of the industry
—*Arthur W. McKinney*

Depreciation E-12
With the advance of industrial technology and the consequent expansion of fixed assets, this subject is vital to the petroleum industry . . . Some of its economic and financial implications are discussed here —*John E. Arens*

NEW EQUIPMENT — SERVICES

Pumps — Engines — Fittings E-14
Valves, corrosive liquid pump, super-charged diesel line, torque converters

Other Equipment E-18
Air conditioners, trucks, buildings, tank cars, weed control material

DRILLING AND PRODUCING

Drilling and Production Equipment Development Sets Fast Industry Pace B-37
New ideas, materials and techniques incorporated in late models reflect rapid pace in research and development.

They Use to Blow Their Tops B-40
Seals on floating roof tanks have been developing for three-quarters of a century. Today, modern sealing mechanisms are effective in retarding fires, smog, and vapor loss. —*Phillip E. Rose*

NEW EQUIPMENT — SERVICES

Geological Tools B-45
Drilling Rigs and Equipment B-48
Drilling Equipment B-52
Drilling Bits — Tools B-56
Mud Equipment B-57
Cementing Equipment B-59
Well Completion Equipment B-61
Well Servicing B-64
Artificial Lift B-66
Lease Instrumentation — Control B-68
Production Process and Handling B-72
Secondary Recovery B-76
Corrosion Control B-76
Field Pumps — Engines B-78
Production Maintenance — Service B-83
General Equipment — Services B-86

REFINING AND PETROCHEMICAL

Refiners' 'Tools of the Trade' C-9

People, processes and products are now being directed more and more closely to fill specific needs. This results in an ever growing number of complex tools to meet the demands of the refiner and his trend toward specialization —*Arch L. Foster*

NEW EQUIPMENT — SERVICES

Instruments — Control C-13
Heat Exchangers and Materials C-17
Pumps-Compressors C-18
Treating C-19
Computers C-21
Storage — Processes C-21
Valves — Fittings — Tools C-24
Electric Motors C-25
Fire — Safety C-26
Laboratory Equipment C-26
Valves C-28
General Equipment C-29

OIL AND GAS PIPELINING

Progress in Pipelining — Equipment, Manpower Use Made More Effective D-13

In all phases of pipelining the key word is automation. Construction goes to larger diameter pipe, heavier equipment —*Frank H. Love*

NEW EQUIPMENT — SERVICES

Construction Equipment D-18
Corrosion — Maintenance — Operation D-26
Communication — Instrumentation D-30
General Equipment D-37

HANDY READY REPLY cards following page E-20 will bring you fast action on your reader service requests. Use them to get further information on the new equipment and service items in this issue . . . for complete information on the products and services advertised.

Circle the number corresponding to the new equipment or service item on which you wish more information, detach and drop in the mail. Free information will be sent you direct from the manufacturer or service company involved. Use these handy reader service cards, they are designed especially for your convenience.

Four Editions
Published Monthly by
The Petroleum Engineer
Publishing Company
800 Davis Building
Dallas 2, Texas

Your Tools Make Time and Money

In the past year more than 2000 new and revised tools, products and services were introduced in the petroleum industry. Ranging from gigantic refining units to minute subsurface tools, each item has played an important role in the improvement of our techniques and know-how.

Your ability to do a better, more productive job is linked directly to the new designs and services made available to you.

Viewing the large number of new items, it might appear that new ideas are easily conceived and quickly developed into useful, efficient devices. History of many of our modern tools reveals that each new model is but one step in the arduous development from basic concept to pilot model to the modern, efficient tool. This path is slow, costly and often requires painstaking years of research, field testing and revision to produce the first commercial unit.

The story does not end with the first model. To keep pace with fast-changing requirements, modifications and revisions must be made, again requiring extensive research and field testing.

For example, modern perforating equipment each year must reach for the proficiency demanded by the latest operations. It is continually being improved for use in deeper wells and to provide flexibility in our smaller well bores. It is a far cry from the mechanical casing ripper used in the early oil wells.

The much publicized turbo-drill has not at this time been made available to the drilling industry and yet its development can be traced back more than 20 years. In the past 10 years alone, two companies have spent more than a million dollars in efforts to perfect this drilling tool. One can only surmise that similar sums of money and time have been expended in the development of the Russian and French versions of the turbo-drill.

The floating roof tank, used to reduce vapor losses and for safety, has stepped firmly toward greater efficiency for more than 75 years. Its need appeared with an explosive display when lightning struck an oil tank in 1880. Design and construction of the first floating roof tank were 10 years in the making and thousands of dollars were spent in experiments, patents and field trials. Considerable time and money are still being invested to improve designs and extend the usefulness of these units.

In the field of refining, this will mark the twentieth year of the commercial cat cracker. The first plant for the production of high octane gasoline went "on stream" following 13 years of extensive research on the part of Eugene J. Houdry and his associates. Millions of dollars were invested in experiments and pilot studies to perfect this first commercial model. Now 20 years later, additional millions are being spent to develop both processes and equipment to meet the growing high octane gasoline demands.

One supplier to the petroleum industry recently reported that its product development program cost $3,000,000 in 1955 and that the 1956 program would be even larger. A part of this increase is the result of greater emphasis on electronics in industry operations.

Regardless of where you work — in the field, on the pipe line, in the refinery — there are men striving to provide you with better equipment and services. These are the keys to your continued progress and prosperity.

James A. Le Velle

In water flooding projects only *Nalco* programs give protection . . all-the-way-'round

Producing well

Water injection well

No. 321 is one of many Nalco Corrosion Inhibitors . . . especially formulated for water flooding systems.

Treating injection water is often only part of proper treatment for water flooding recovery projects. That's why a Nalco program has two separate features: It conditions injection water . . . it stops corrosion in producing wells . . . thus assures you effective all-the-way-'round protection.

Outstanding chemicals . . . *and service* . . . for control of scale, corrosion, turbidity and microbio growth have made Nalco the world's largest water treating organization, superbly equipped to treat injection waters. And amazing new corrosion inhibitors . . . for producing wells . . . enable Nalco to offer you a *complete* protective program.

Nalco Bulletins G1 and G2 will tell you more about these effective treatments. We invite you to write for them . . . and to consider the efficiency and economy that you can gain through having a single source for chemicals, service . . . and responsibility.

NATIONAL ALUMINATE CORPORATION
6216 West 66th Place • Chicago 38, Illinois
NORTHWESTERN UNITED STATES, HAWAII and ALASKA
The Flox Company, Inc., Minneapolis 3, Minnesota
CANADA: Alchem Limited, Burlington, Ontario
ITALY: Nalco Italiana, S.p.A. SPAIN: Nalco Espanola, S.A.
WEST GERMANY: Deutsche Nalco-Chemie GmbH.

THE *Nalco*® SYSTEM

SERVING THE PETROLEUM INDUSTRY THROUGH PRACTICAL APPLIED SCIENCE

Your Tools Make Time and Money

In the past year more than 2000 new and revised tools, products and services were introduced in the petroleum industry. Ranging from gigantic refining units to minute subsurface tools, each item has played an important role in the improvement of our techniques and know-how.

Your ability to do a better, more productive job is linked directly to the new designs and services made available to you.

Viewing the large number of new items, it might appear that new ideas are easily conceived and quickly developed into useful, efficient devices. History of many of our modern tools reveals that each new model is but one step in the arduous development from basic concept to pilot model to the modern, efficient tool. This path is slow, costly and often requires painstaking years of research, field testing and revision to produce the first commercial unit.

The story does not end with the first model. To keep pace with fast-changing requirements, modifications and revisions must be made, again requiring extensive research and field testing.

For example, modern perforating equipment each year must reach for the proficiency demanded by the latest operations. It is continually being improved for use in deeper wells and to provide flexibility in our smaller well bores. It is a far cry from the mechanical casing ripper used in the early oil wells.

The much publicized turbo-drill has not at this time been made available to the drilling industry and yet its development can be traced back more than 20 years. In the past 10 years alone, two companies have spent more than a million dollars in efforts to perfect this drilling tool. One can only surmise that similar sums of money and time have been expended in the development of the Russian and French versions of the turbo-drill.

The floating roof tank, used to reduce vapor losses and for safety, has stepped firmly toward greater efficiency for more than 75 years. Its need appeared with an explosive display when lightning struck an oil tank in 1880. Design and construction of the first floating roof tank were 10 years in the making and thousands of dollars were spent in experiments, patents and field trials. Considerable time and money are still being invested to improve designs and extend the usefulness of these units.

In the field of refining, this will mark the twentieth year of the commercial cat cracker. The first plant for the production of high octane gasoline went "on stream" following 13 years of extensive research on the part of Eugene J. Houdry and his associates. Millions of dollars were invested in experiments and pilot studies to perfect this first commercial model. Now 20 years later, additional millions are being spent to develop both processes and equipment to meet the growing high octane gasoline demands.

One supplier to the petroleum industry recently reported that its product development program cost $3,000,000 in 1955 and that the 1956 program would be even larger. A part of this increase is the result of greater emphasis on electronics in industry operations.

Regardless of where you work — in the field, on the pipe line, in the refinery — there are men striving to provide you with better equipment and services. These are the keys to your continued progress and prosperity.

James A. Le Velle

In water flooding projects only *Nalco* programs give protection . . . all-the-w[illegible]ound

Producing well

Water injection well

No. 321 is one of many Nalco Corrosion Inhibitors . . . especially formulated for water flooding systems.

Treating injection water is often only part of proper treatment for water flooding recovery projects. That's why a Nalco program has two separate features: It conditions injection water... it stops corrosion in producing wells... thus assures you effective all-the-way-'round protection.

Outstanding chemicals... *and service*... for control of scale, corrosion, turbidity and microbio growth have made Nalco the world's largest water treating organization, superbly equipped to treat injection waters. And amazing new corrosion inhibitors . . . for producing wells . . . enable Nalco to offer you a *complete* protective program.

Nalco Bulletins G1 and G2 will tell you more about these effective treatments. We invite you to write for them . . . and to consider the efficiency and economy that you can gain through having a single source for chemicals, service . . . and responsibility.

NATIONAL ALUMINATE CORPORATION
6216 West 66th Place • Chicago 38, Illinois
NORTHWESTERN UNITED STATES, HAWAII and ALASKA
The Flox Company, Inc., Minneapolis 3, Minnesota
CANADA: Alchem Limited, Burlington, Ontario
ITALY: Nalco Italiana, S. p. A. SPAIN: Nalco Espanola, S. A.
WEST GERMANY: Deutsche Nalco-Chemie GmbH.

THE *Nalco*® SYSTEM

SERVING THE PETROLEUM INDUSTRY THROUGH PRACTICAL APPLIED SCIENCE

ADVERTISERS' INDEX

A

Acme Oil Tool Co. E-27
Advance Oil Tool Co. B-97
Ajax Iron Works B-13
Alco Products, Inc. B-108
Aldrich Pump Company, The E-32
Allis Chalmers B-111, B-119, D-48
Alston Manufacturing Co. D-34
Alten Foundry & Machine Works, Inc. B-110
Ampco Metal, Inc. B-73, B-95, C-27

B

B and W Incorporated B-12
Baash-Ross Tool Company, Division of Joy Manufacturing Company B-28
Baker Oil Tools, Inc. B-26-B-27, B-36
Baldwin-Lima-Hamilton Corporation C-30
Barksdale Valves E-33
Bendix Aviation Corp., Scintilla Division A-10
Berry Division, Oliver Iron & Steel Corporation D-30
Beta Corporation, The E-15
Bethlehem Supply Company B-5
Black, Sivalls & Bryson, Inc. B-115
Brakesol, Inc. E-27
Brewster Company B-99-B-102
Burns Tool Company B-8
Byron Jackson Oil Tools, Inc. B-117

C

Cardwell Manufacturing Company B-30-B-31
Cavins Co., The B-97
Chapman Valve Manufacturing Co., The E-2
Cherokee Laboratories, Inc. B-130
Chicago Bridge & Iron Company E-1c
Chicago Pneumatic Tool Co. B-135
Cinch Pipeline Equipment, Inc. D-34
Classified E-38
Cleveland Trencher Company, The D-46
Climax Engine & Pump Mfg. Co. B-116
Colorado Fuel & Iron Corporation, The B-144
Continental Oil Company B-125
Continental Supply Company B-7
Core Laboratories, Inc. B-29
Crane Co. D-41
Curtin, W. H., & Co. C-30

D

Dearborn Chemical Company D-3
Dicalite Division, Great Lakes Carbon Corp. C-22
Dollinger Corporation D-34
Dowell Incorporated ... Inside Front Cover, A-9
Drilling & Service B-114
Drilling Specialties Company B-6
Durametallic Corporation E-40
Duriron Company, Inc., The D-12

E

E-I-M Company, Incorporated D-43
Eastman Oil Well Survey Company B-25
Edward Valves, Inc. B-77
Emerol Mfg. Co. B-24
EMSCO Manufacturing Company B-10, B-22
Ensign Carburetor Company A-13

F

Fairbanks, Morse & Co. B-122
Fisher Governor Company A-14-A-15
Fleet-Line Co. D-35
Fluor Corporations, Ltd., The E-1a
Foxboro Company, The C-4
Franks Division, Cabot Shops, Inc. Back Cover

G

Garrett Oil Tools, Inc. B-118
Gaso Pump & Burner Mfg. Co. D-2
General Mills E-30
Goslin-Birmingham E-1e
Grove Valve & Regulator Company D-39
Guiberson Corporation, The B-15

H

Haering, D. W., & Co., Inc. E-22
Halliburton Oil Well Cementing Company ..... Front Cover, B-134
Harshaw Chemical Co., The C-38
Hercules Tool Company B-84
Hill, Hubbell & Company D-1
Homelite, a Division of Textron, Incorporated E-26-E-27
Hotel Pittsburgher E-15
Houston Contracting Company D-28
Houston Tool Co. B-85
Humble Oil & Refining Company A-11
Hutchison Manufacturing Co. B-105
Hydril Company B-9
Hydramotive, Inc. E-31

I

Ingalls Shipbuilding Corporation, The B-89
Ingersoll-Rand E-36-E-37
Insley Manufacturing Corp. E-1h

J

Jensen Bros. Mfg. Co., Inc. B-89
Jerguson Gage & Valve Company C-25
Johns-Manville D-50
Johnston Testers B-18-B-19
Jones, S. M., Company, The B-3
Jones & Laughlin Steel Corporation, Supply Division C-2

K

Kaiser Steel Corporation E-1d
Kellogg Switchboard & Supply Company E-40
Koehring Company D-9
Koppers Company, Inc. D-49, D-52

L

Ladish Co. E-25
Lane-Wells Company ... Inside Back Cover, B-2
Larkin Packer Company, Inc. B-36-B-37
LeRoi Division of Westinghouse Air Brake Co. E-34
Lone Star Cement Corporation B-4
Lone Star Steel Company B-96
Luber-Finer, Inc. B-85
Lucey Export Corporation B-138
Lufkin Foundry & Machine Company B-131
Lunkenheimer Company, The E-35

Mc

McCullough Tool Company B-17
McEvoy Company B-35

M

Madsen Works C-30
Magnet Cove Barium Corporation B-21
Maloney, F. H., Company D-44
Maloney-Crawford Tank & Manufacturing Co. B-20
Manzel, a Division of Houdaille Industries, Inc. E-21
Martin-Decker Corp. B-105
Martin, John N., Manufacturer B-16
Mathey, C. A., Mach ne Works, Inc. D-37
Minneapolis-Honeywell Regulator Co. D-40
Mission Manufacturing Co. B-128-B-129
Moore, Lee C., Corporation B-109
Motorola Communications & Electronics, Inc. D-51

N

National Aluminate Corporation A-5
National Supply Company, Inc., The B-79-B-82
National Tank Company E-42
National-U. S. Radiator Corporation C-23
Naylor Pipe Company A-12
Nordberg Mfg. Co. B-23, D-4-D-5
Norris, W. C., Manufacturer, Inc. A-1

O

Oakite Products, Inc. C-30
Ohio Injector Company, The A-16
Oil Base, Inc. B-112-B-113
Oil Center Tool Co. B-1
Oil Well Supply Division A-7
Orbit Valve Company B-127

P

Parsons Company D-8
Pazdral Tod D-47
Pelican Supply Co., Inc. D-31
Perforating Guns Atlas Corporation B-147
Petro-Chem Development Co., Inc. A-8
Petroleum Electric Power Association E-17
Philco Corporation D-6-D-7
Philadelphia Gear Works, Inc. E-40
Pipe Line Anode Corporation D-38
Pipeline Cleaners Co. D-30
Pittsburgh Lectrodryer Corporation C-7
Pipe Line Development Co., The D-31
Pipeline Coating & Engineering Co., Inc. D-27
Pilco, Inc. D-25
Plicoflex, Inc. C-6
Polyken Sales Division, The Kendall Company D-42
Porto-Pump, Inc. B-97
Powell Valves C-39
Price, H. C., Co. D-26
Pritchard, J. F., & Co. D-32-D-33
Procon Incorporated C-34

R

Radio Corporation of America D-29, D-45
Rector Well Equipment Company, Inc. B-143
Reda Pump Company B-91
Reed Roller Bit Company B-136
Republic Flow Meters Co. C-35
Ridge Tool Company, The E-28
Rockford Clutch Division Borg-Warner B-72
Roebling's, John A., Sons Corporation E-39
Rollway Bearing Company B-142
Rolo Manufacturing Co. B-93
Roper, Geo. D., Corporation D-23

S

Schield-Bantam Co. D-24
Schlumberger Well Surveying Corp. B-11
Shaffer Tool Works B-146
Sigmamotor, Inc. C-31
Smith, A. O., Corporation D-11
Somerville Construction Co. D-24
Southwest Industries, Inc. B-137
Spang & Company B-75
Sperry-Sun Well Surveying Company D-36
Standard Pipeprotection, Inc. D-22
Stearns-Roger Mfg. Co. C-42
Stewart & Stevenson Services, Inc. E-18-E-19
Stitt Ignition Co. E-23
Sun Shipbuilding & Dry Dock Company C-1

T

Tapecoat Company, The D-29
Technical Oil Tool Corp., Ltd. B-132
Thompson Tool Co. E-14
Thornhill-Craver Co. B-141
Toledo Pipe Threading Machine Co. E-33
Tuboscope Company B-153
Twin Disc Clutch Company B-34

U

Union Switch & Signal Division of Westinghouse Air Brake Co. D-10
Unit Crane & Shovel Corporation B-123
United States Rubber Company C-5
United States Steel Corporation A-7
Universal Oil Products Company C-36-C-37

V

Vermeer Manufacturing Co. D-33
Virginia Gear & Machine Corp. E-40
Visco Products Co., Inc. E-1
Vogt, Henry, Machine Co. C-8

W

W-K-M Manufacturing Company, Inc., A Subsidiary of A C F Industries Incorporated E-1g
W-S Fittings Division, H. K. Porter Company, Inc. E-23
Walker, W. L., Co. D-22
Walworth Company E-1h
Waukesha Motor Company B-32
Waukesha Sales & Service, Inc. E-41
Web Wilson Oil Tools, Inc. B-139-B-140
Welex Jet Services, Inc. B-14
Well Equipment Mfg. Corp. B-148
Western Company, The B-33
Western Supply Company C-41
Weston Electrical Instrument Corporation C-40
Wheeling Machine Products Company E-20
Whitmor Homebuilders, Inc. D-21
Wickes Boiler Co., The C-8
Wickwire-Spencer Steel Division, Colorado Fuel & Iron Corporation, The B-120-B-121
Wilkinson Products Co. D-31
Williams Gauge Co., Inc., The E-21
Williamson, T. D., Inc. D-20
Willis Oil Tool Company B-71
Wilson Manufacturing Company B-145
Wilson Supply Co. B-124
Wisconsin Motor Corporation E-16
Wyatt Metal & Boiler Works E-1f

Y

Young Radiator Company B-24
Youngstown Sheet & Tube Company, The E-29

They're pumping gas to underground storage with this "Oilwell" Direct-Connected Compressor Unit

STUDY this photograph a minute! It's an "Oilwell" DGE-125 direct-connected duplex compressor unit that has just been delivered to location—ready for foundation bolts and piping connections.

It's truly a "packaged unit," even to pressure gages, controls and up-draft cooling facilities for engine and compressors, all mounted on a structural steel skid base.

Note the narrow width of these parallel compressors, powered by an in-line direct drive from the engine through right-angle, spiral-bevel gears.

In this installation . . .

. . . natural gas is being taken from low-pressure field lines, compressed and injected into underground formations which previously contained gas for storage near Zanesville, Ohio. Two 9-inch stroke compressors—one cylinder with 5½-inch diameter and the other with 3⅛-inch diameter—constitute this two-stage, duplex-type unit, which is capable of handling up to 744,000 cu. ft. of gas per day with 125 psig suction and 1,200 psig discharge at compressor speeds of 325 rpm.

Let an "Oilwell" Engineer . . . assist in the selection of the compressor for your next installation, from one of these completely packaged duplex-type units. They're available in 125, 175, 200, 250 and 300 hp sizes.

OIL WELL SUPPLY
DIVISION
UNITED STATES STEEL CORPORATION

Executive Offices—DALLAS, TEXAS
Export Office—
30 ROCKEFELLER PLAZA
NEW YORK 20, N. Y.

Area Offices— CALGARY, CANADA
CASPER, WYOMING....COLUMBUS, O.
DALLAS, TEXAS....HOUSTON, TEXAS
TULSA, OKLA...LOS ANGELES, CALIF.

Branches Serving All Oil Fields

USS TRADE MARK

"OILWELL" TRADE MARK

UNITED STATES STEEL

11 ALL-IMPORTANT FACTORS WHICH DETERMINE THE VALUE AND EFFICIENCY OF PROCESSING FURNACES

✔**UNIFORM HEAT DISTRIBUTION**
MAXIMUM FUEL EFFICIENCY
PLENUM CHAMBERS FOR HAZARDOUS AREAS
SIMPLICITY OF DESIGN AND CONSTRUCTION
EXCESS DRAFT FOR HIGH OVERLOAD
EXPLOSION RESISTANT
MINIMUM GROUND SPACE
SHORT LENGTH OF LIQUID TRAVEL
ZERO AIR LEAKAGE
LOW PRESSURE DROP
LOW MAINTENANCE

✔**UNIFORM HEAT DISTRIBUTION** the most desirable heater characteristic is created in an Iso-Flow furnace by:

1. Individual burners are so spaced in relationship to the heating elements that they create a symmetrical flame pattern with relation to the tubes;

2. The metal cone at the top of the combustion chamber re-radiates to the tubes, also diverts combustion gases progressively closer to the tubes to give a uniform heat intensity at the upper portion of the combustion chamber;

3. The combustion gases, at the top of the heater, are diverted towards the walls where they recirculate from the top of the heater downward, behind and between the tubes, increasing the heat input to the rear of the heating elements by convection;

4. The recirculated gases reduce the heat intensity at the bottom of the furnace so that the heat input is the same, top and bottom.

These factors provide the completely uniform heat distribution required in heaters for the most efficient process operation.

In every case where these 11 all-important design characteristics were employed to compare one type of furnace design with another, PETROCHEM-ISOFLOW FURNACES *were proved most efficient by any comparison.*

Prove PETROCHEM-ISOFLOW FURNACES Most Efficient by Any Comparison

More than 1200 PETROCHEM-ISOFLOW FURNACES *are in operation throughout the world in the petroleum, chemical and allied industries . . . for all processes and for any duty, pressure, temperature and efficiency . . . and all Petrochem-Isoflow Furnaces are pre-eminently satisfactory.*

PETROCHEM-ISOFLOW FURNACES

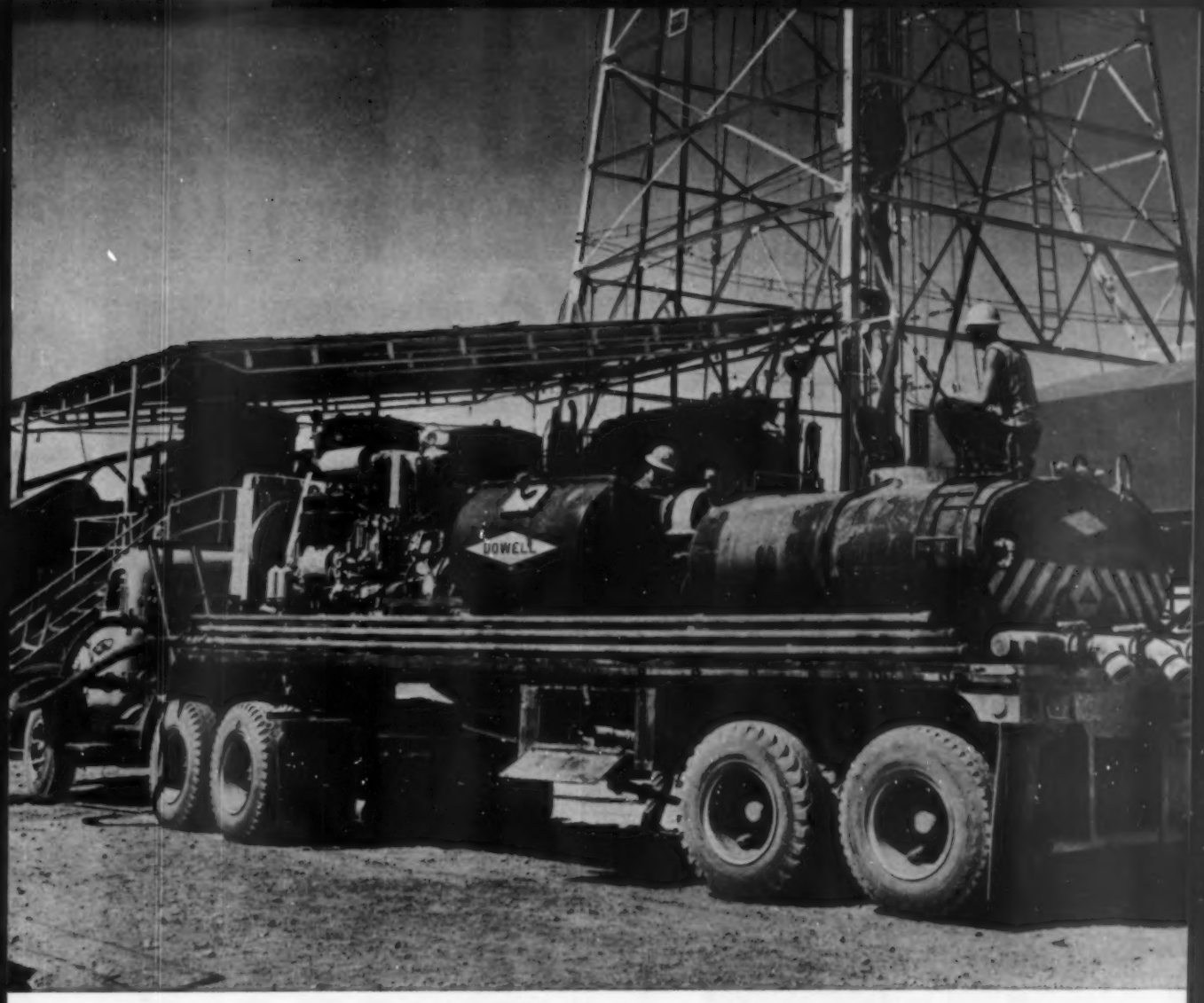
UNLIMITED IN SIZE . . . CAPACITY . . . DUTY

PETRO-CHEM DEVELOPMENT CO., INC. • 122 EAST 42nd St., New York 17, N. Y.

REPRESENTATIVES:

Rawson & Co., *Houston* • Wm. H. Mason Co., *Tulsa* • Lester Oberholtz, *Los Angeles* • Faville-Levally, *Chicago* • D. D. Foster, *Pittsburgh* • Turbex, *Philadelphia* • Flagg, Brackett & Durgin, *Boston* • G. M. Wallace & Co., *Denver & Salt Lake City*

International Licensees and Representatives: SETEA—S.A. Comercial, Industrial, y de Estudios Tecnicos, *Buenos Aires, Argentina* • Industrial Provesedora, *Caracas, Venezuela* • Societe Anonyme Heurtey, *Paris, France* • Societe Anonyme Belge, *Liege, Belgium* • Heurtey Italiana S.P.A., *Milan, Italy* • Birwelco Ltd., *Birmingham, England*



SANDFRAC

Fracturing tailored by DOWELL—using either lease crude or refined oils

It's production increases you want when you buy fracturing. Sandfrac® treatments, developed by Dowell, have an outstanding success record in sandstone, conglomerate and dolomitic formations. Treatments have paid out in as little as five days.

Sandfrac employs either lease crudes or special refined oils. If necessary, the oils may be modified to control thickness, fluid loss and emulsions. Sandfrac is fast, requires no special well equipment, no lengthy shut-in, no gel-breaker.

Experienced Dowell service engineers recommend the quantity and type of sand best suited to your well . . . to help reduce sand screen-outs in tight pay zones. A spearhead of Mud Acid may be used, if necessary, to reduce injection pressures and speed well cleanup.

For Sandfrac service, or for more information, call any of the 165 Dowell offices in the United States and Canada; in Venezuela, contact United Oilwell Service. Or write Dowell Incorporated, Tulsa 1, Oklahoma, Department G-12.

services for the oil industry

DOWELL

A SERVICE SUBSIDIARY OF THE DOW CHEMICAL COMPANY

Look at All You Get in the New Bendix LC IGNITION!

1. Long service life
2. Simplified maintenance
3. Longer spark plug life
4. No unscheduled ignition shutdowns
5. Positive spark timing
6. High voltage output
7. Matched ignition system
8. Single or dual ignition
9. Flame proof
10. Low maintenance costs
11. For engines of 6 through 16 cylinders

Designed Specifically for the Petroleum Industry

Just check these outstanding exclusive features and you will know why the Bendix* LC Magneto has been engineered to meet the exacting requirements of the modern high-compression gas engines used so widely throughout the petroleum industry.

As the Bendix LC is a completely new type of magneto, it incorporates the latest development in material, engineering, design and production techniques. The result is a matched ignition system—LC Magneto plus Bendix Hi-V Transformer coils—that delivers more than ample voltage with greatly reduced maintenance costs.

For engines of 6 to 16 cylinders where top performance is a must, the new Bendix LC Magneto is the logical choice.

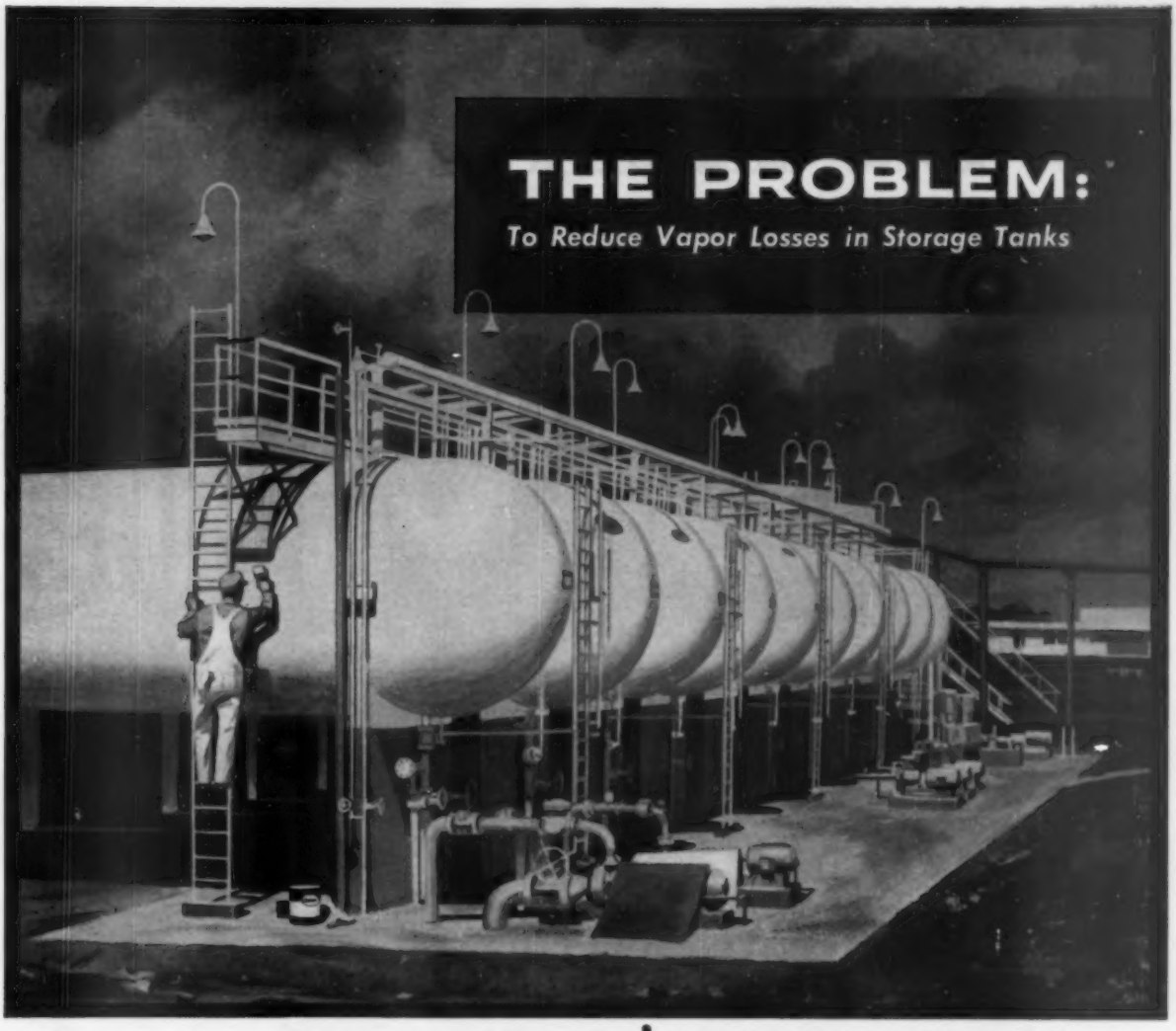
Complete descriptive folder is available on request.

*TRADE MARK

SCINTILLA DIVISION, BENDIX AVIATION CORP., SIDNEY, N. Y.
Export Sales and Service:
Bendix International Division, 205 East 42nd St., New York 17, N. Y.
FACTORY BRANCH OFFICES: 117 E. Providencia Avenue, Burbank, California • 512 West Avenue, Jenkintown, Pennsylvania • Stephenson Building, 6560 Cass Avenue, Detroit 2, Michigan • 5906 North Port Washington Road, Milwaukee 17, Wisconsin • American Building, 4 S. Main St., Dayton 2, Ohio • 8401 Cedar Springs Road, Dallas 19, Texas Boeing Field, Seattle 8, Washington • 1701 "K" Street, N. W., Washington 6, D. C.

Bendix
SCINTILLA DIVISION

Bendix
AVIATION CORPORATION



THE SOLUTION: *Humble's Light and Heat Reflective* **Exterior White Enamel 460**

The light and heat reflective properties of Humble's Exterior White Enamel 460 effectively reduce vapor losses from such highly volatile products as LP Gas and gasoline by reducing interior temperatures in storage tanks. When it is applied over a Rust-Ban priming system, you also get superior protection against extreme weathering and corrosive fumes, plus good color and gloss retention.

Humble produces a complete line of protective coatings—Rust-Bans, paints and enamels, each designed for a specific task.

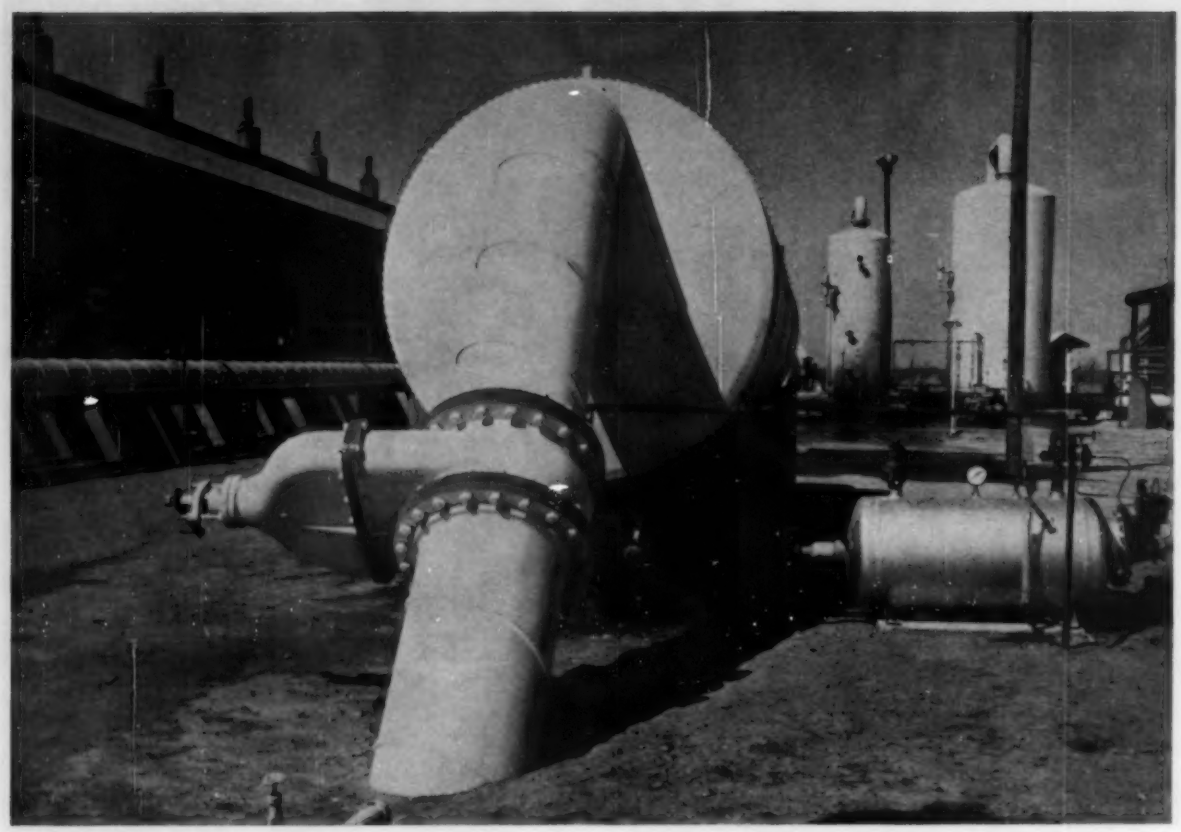
For more information on Humble protective coatings, see your nearest Humble wholesale plant in Texas and New Mexico, or write or phone:

Technical Service,
Sales Department,
Humble Oil & Refining Company,
P. O. Box 2180, Houston 1, Texas.

HUMBLE

HUMBLE OIL & REFINING COMPANY

It's the SPIRAL that Tells the Story



The familiar spiral that distinguishes Naylor from all other pipe in oil field service is more than just an identifying feature. It tells you that the pipe is light in weight and therefore easier and more economical to handle and install. It assures you that Naylor pipe is extra strong and extra safe because the exclusive lockseamed, spiral-welded structure acts as a continuous expansion joint to absorb shock loads, stresses and strains. It is evidence, too, of the greater collapse strength that permits operation of Naylor lines under either vacuum or pressure. Moreover, it's this spiral truss that gives the pipe its true cylindrical form and holds its diameter so accurately.

Naylor Spiralweld pipe comes in diameters from 4″ to 30″, available with standard weight pipe ends for faster, stronger field welds. Write for Bulletin No. 507 or call our distributors.

NAYLOR PIPE

NAYLOR PIPE COMPANY
1240 East 92nd Street
Chicago 19, Illinois

Exclusive Distributors in
Mid-Continent and Gulf Coast Areas
MID-CONTINENT SUPPLY CO.
Ft. Worth, Texas and Branches

Eastern U. S. and Foreign Sales Office: 350 Madison Avenue, New York 17, New York

A COMPLETELY NEW FACTORY TO SERVE YOU!

Ensign

A large new ultra-modern plant, complete in every detail is being erected by Ensign in Fullerton, California. From this factory will come completed units for the Western and Mid-Continent markets as well as sub-assemblies for our Chicago Assembly and Service Plant.

Building a new factory, like a new home, is an evidence of a faith and confidence in the future. For the fourth time in our history we are building an entirely new factory to meet the needs for specially designed Ensign carburetion equipment. This time our expansion is far greater — far more complete than any other, not only in plant production facilities but in research and engineering which will contribute to the continued product development expected of leaders in the automotive field.

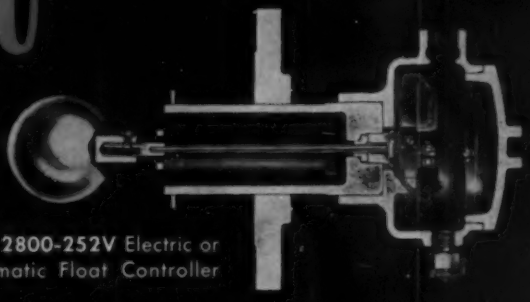
We are exceedingly grateful to our thousands of customers who have, at times, waited weeks and months for shipments of carburetors, vaporizers, filters, etc. With this huge new Ensign production plant, which sometime this year will be "put on the line" we shall be able to alleviate shortages and to meet the demands for Ensign equipment for a long time to come. Coincident with the scheduled completion of our new factory this year we shall also mark the beginning of our 46th year in the carburetor business.

ENSIGN CARBURETOR COMPANY

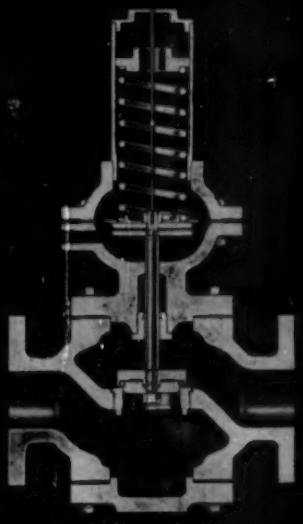
FULLERTON, CALIFORNIA

"PIONEERS IN EFFICIENT CARBURETION SINCE 1911"

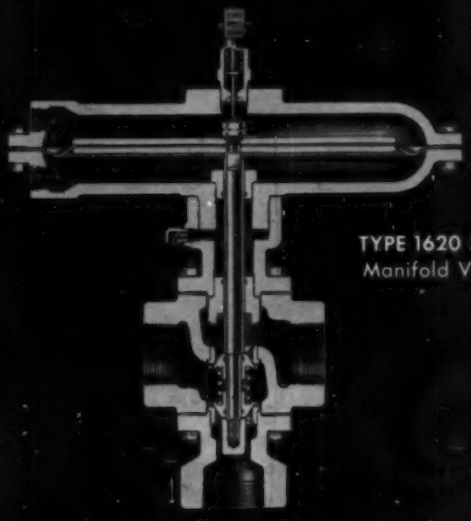
Equipment Lease for Your



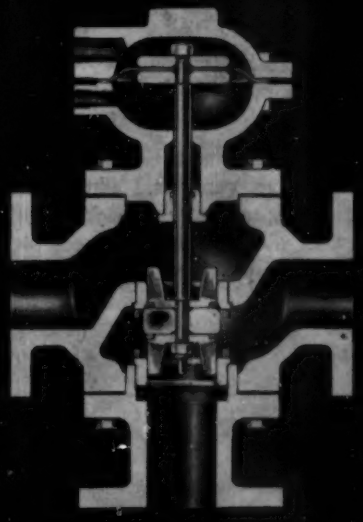
TYPE 2800-252V Electric or Pneumatic Float Controller



TYPE 1563 2-Way Tank Filling Valve

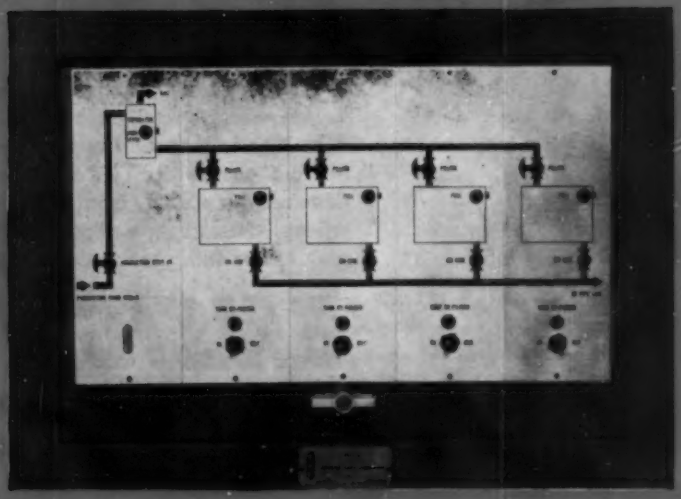


TYPE 1620 3-Way 3-Position Manifold Valve



TYPE 1663 3-Way Tank Filling or Routing Valve

PANEL EQUIPMENT



Electric Tank Switcher

Automation by FISHER®

To Better Serve The Oil Production Industry...

FISHER GOVERNOR COMPANY

Announces

THE PURCHASE OF

CONTROL SPECIALTY CORPORATION

HOUSTON, TEXAS

which will be operated as a subsidiary.

The reputation and production facilities at the Houston plant will enable Fisher Governor Company to offer every phase of tank switching or complete automation from well head to pipeline, regardless of whether power source is to be pneumatic, electro-pneumatic or electrical.

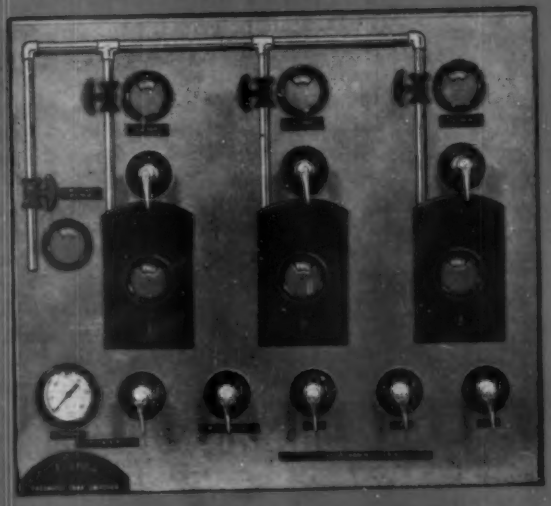
Our representative in your area will welcome the opportunity to discuss your lease automation requirements.

FISHER GOVERNOR COMPANY

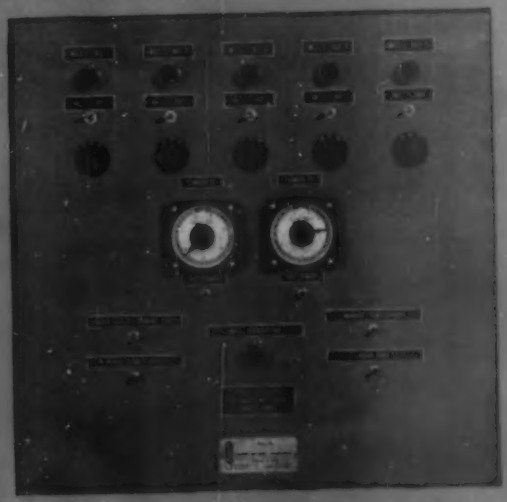
MARSHALLTOWN, IOWA · WOODSTOCK, ONTARIO

LEADS THE INDUSTRY IN RESEARCH FOR BETTER PRESSURE AND LIQUID LEVEL CONTROL

BY CONTROL SPECIALTY CORPORATION



Pneumatic Tank Switcher



Cyclotest Electric Well Test Controller

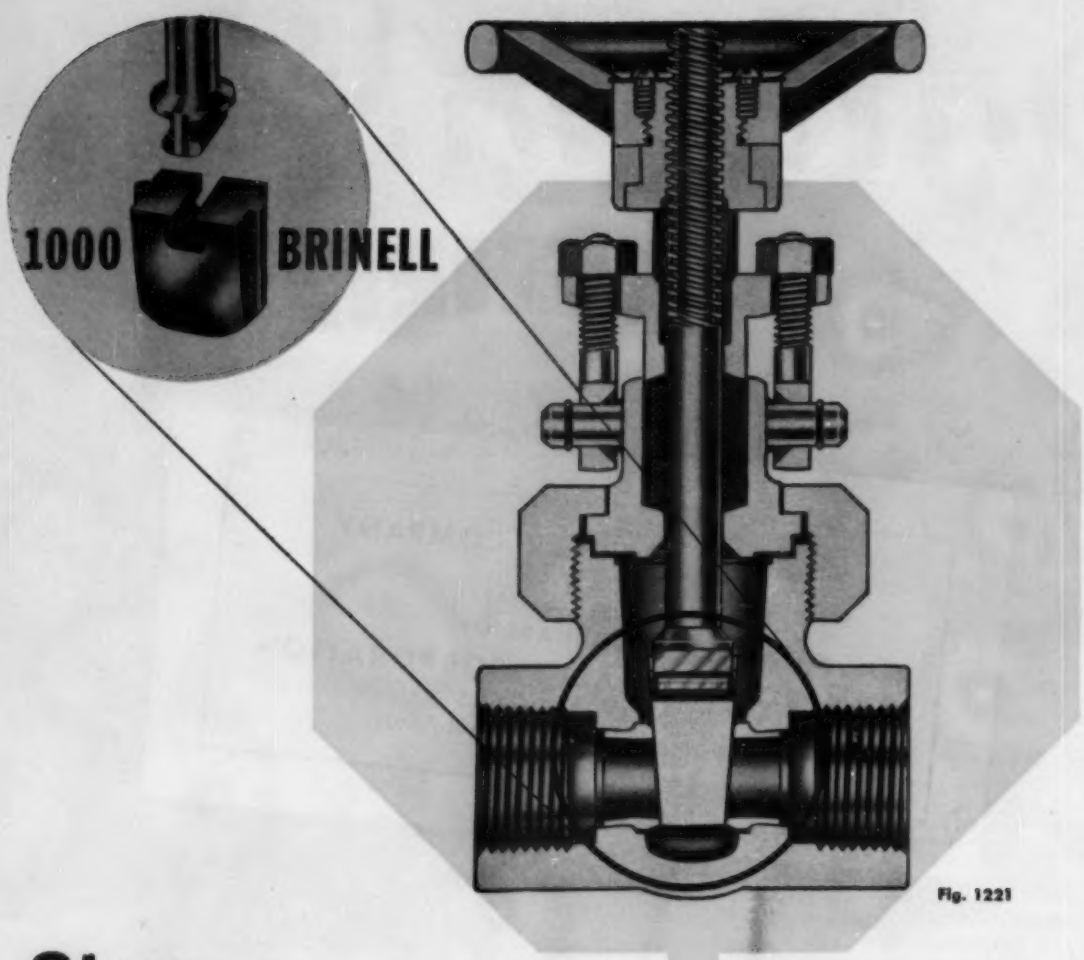


Fig. 1221

Stop Galling with the hardest valve wedges you can buy

OIC VALVES | FORGED & CAST STEEL, LUBRICATED PLUG, BRONZE & IRON VALVES

Highly resistant to erosion and corrosion

Here's a wedge as hard as flint . . . so hard that it's undamaged by pipe cuttings, scale or grit. It's the only trim we know of which will successfully withstand the simultaneous attack of the three valve-destroying agents—corrosion, erosion, galling. This wedge is *13% chrome stainless steel hardened up to 1000 Brinell.*

Specify the OIC 1221 gate or 1621 globe where you need the extra rugged nature of forged steel. They are recommended for steam service up to 800°F...oil service up to 1000°F. Or, use these same valves for hydraulic service up to 2000 lbs.

Write for Form 195 for specifications on the OIC forged steel line.

THE OHIO INJECTOR COMPANY
WADSWORTH, OHIO

For your new NITRIC ACID *plant*

LOOK FIRST TO FLUOR

For new nitric acid production facilities, you can now call on Fluor, licensed to design and construct plants based on the DuPont Pressure Process. Fluor's long experience in the process industries is your insurance of a nitric acid production facility with low initial cost and trouble-free operation. The Fluor organization's complete integration permits each project to be carried through all phases . . . design, procurement, and construction . . . under a single responsibility.

The process offered is economical and completely proven, using only three raw materials—air, ammonia, and distilled water. Capacity may be as low as 50 tons per day or as high as required. An integral energy-recovery system substantially reduces horsepower requirements, and the plants are characterized by minimum operating costs.

FLUOR

Engineers • Constructors

The FLUOR CORPORATION, Ltd.

2500 So. Atlantic Boulevard, Los Angeles 22, California • Offices in Principal Cities in the United States and Canada

Fluor's unique ability to see every project *as a whole* . . . the economic as well as the technical details . . . is described, along with process description and operating requirements, in a new folder, NITRIC ACID PLANTS. Write for your copy today.

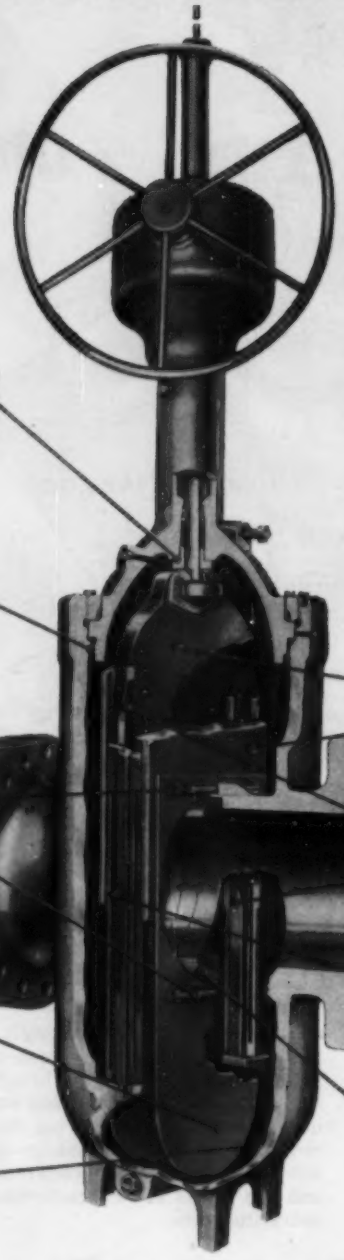
For Gas or Oil Pipelines . . .

HERE'S WHY OILMEN SPECIFY TYPE 49

Check these type **49** *features:*

- **Especially designed for pipelines handling crude oil, refined products, or gas.**
- **Easy passage for pigs or scrapers.**
- **No recesses to trap dirt.**
- **Install in any position, for flow in either direction.**
- **Complete line from sizes 2 to 30 inches in series 400 & 600.**

For more information, see your nearest Walworth Distributor or write to Walworth Company, General Offices, 60 East 42nd St., New York 17, N. Y. Ask for Circular 137.



Bonnet bushing **screws into the bonnet and is tack-welded in place . . . guides the stem, also retains plastic packing which is adjusted by a packing screw.**

Boltless, flangeless bonnet joint, **sealed with ring gasket, stays tight at all pressures. This design saves room, weight.**

Hard chromium-plated discs **resist corrosion, abrasion.**

Loading bars **press disc shield plates axially to wipe discs clean while valve is closing or opening.**

Leakproof closure, **provided by wedging surfaces on each guide and sides of the discs. Wedging surfaces press discs against seat rings.**

Disc shield plates **contact disc faces at all times to prevent dirt from entering the body cavity.**

Loading bars, **incorporated on the disc guides, press the discs axially against the seat rings to provide wiping action between the disc and seat ring faces.**

Valve needs no body-packing grease.

Backseated seat rings screw directly into body **with perfect alignment. Stellite or bronze facing on ring.**

Cutaway of a 16-inch Walworth Type 49 Cast Steel Pipeline Gate Valve

WALWORTH

Manufacturers since 1842

valves . . . pipe fittings . . . pipe wrenches

60 East 42nd Street, New York 17, N. Y.

Walworth Company of Canada, Ltd., Toronto

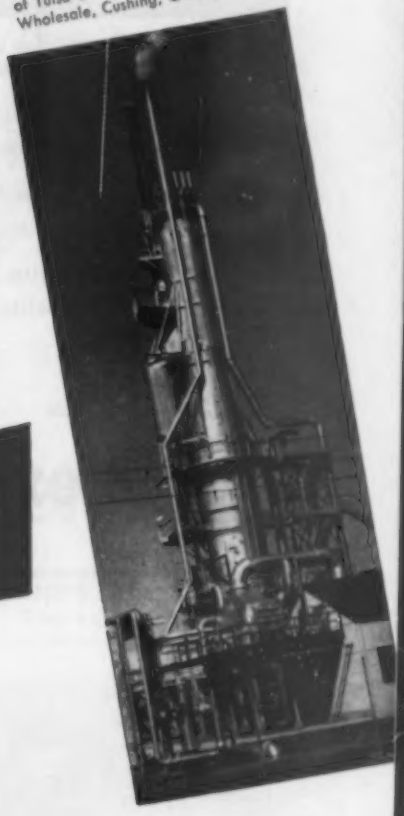
For quick opening or closing Walworth manufactures lubricated plug valves for pipelines in sizes to 30-inches . . . pressures to 5000 psi and for vacuum service. Ask for literature.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

Reactor-regenerator for UOP Catalytic Cracking Unit furnished through Refining Engineering Co. of Tulsa for Kanotex Refining Company, Arkansas City, Kansas.

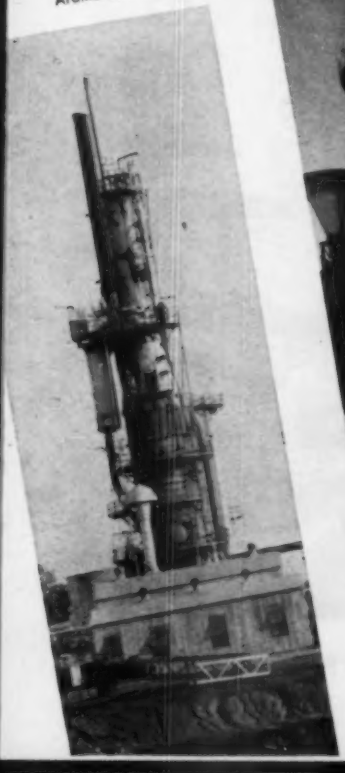
Reactor-regenerator and two cat hoppers built for Rock Island Refining Company at Zionsville, Ind.

UOP reactor-regenerator built for the Refining Engineering Company of Tulsa at Midland Cooperative Wholesale, Cushing, Oklahoma.



REFINERY BEAUTY

UOP reactor-regenerator unit furnished for the Ben Franklin Refining Co., Ardmore, Oklahoma.



Regenerator, part of a Model IV Catalytic Cracking Unit, furnished through Fluor Corporation Ltd. for Standard Oil Company of California, El Segundo, California.

Where there are refining operations there are sure to be welded steel plate structures built by CB&I. Pressure vessels, cat crackers, Hortonspheres®, Hortonspheroids®, Horton® Floating Roofs and others . . . refinery structures built to exacting specifications by skilled craftsmen.

When *you* plan refinery structures, write our nearest office for information, estimates or quotations.

CBI

Chicago Bridge & Iron Company

Atlanta • Birmingham • Boston • Chicago • Cleveland • Detroit • Houston
Los Angeles • New York • Philadelphia • Pittsburgh • Salt Lake City
San Francisco • Seattle • Tulsa
Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PA.
REPRESENTATIVES AND LICENSEES:
Brazil • Canada • England • France • Italy • Netherlands • Scotland • Venezuela

IT'S NEARING COMPLETION...
PACIFIC NORTHWEST PIPELINE'S
"SCENIC INCH"

Winding across New Mexico's deserts, climbing the snow-capped Colorado Rockies and ending at last in the evergreen country of Oregon and Washington . . . Pacific Northwest Pipeline Corporation's 2300-mile "Scenic Inch" is being rushed to completion.

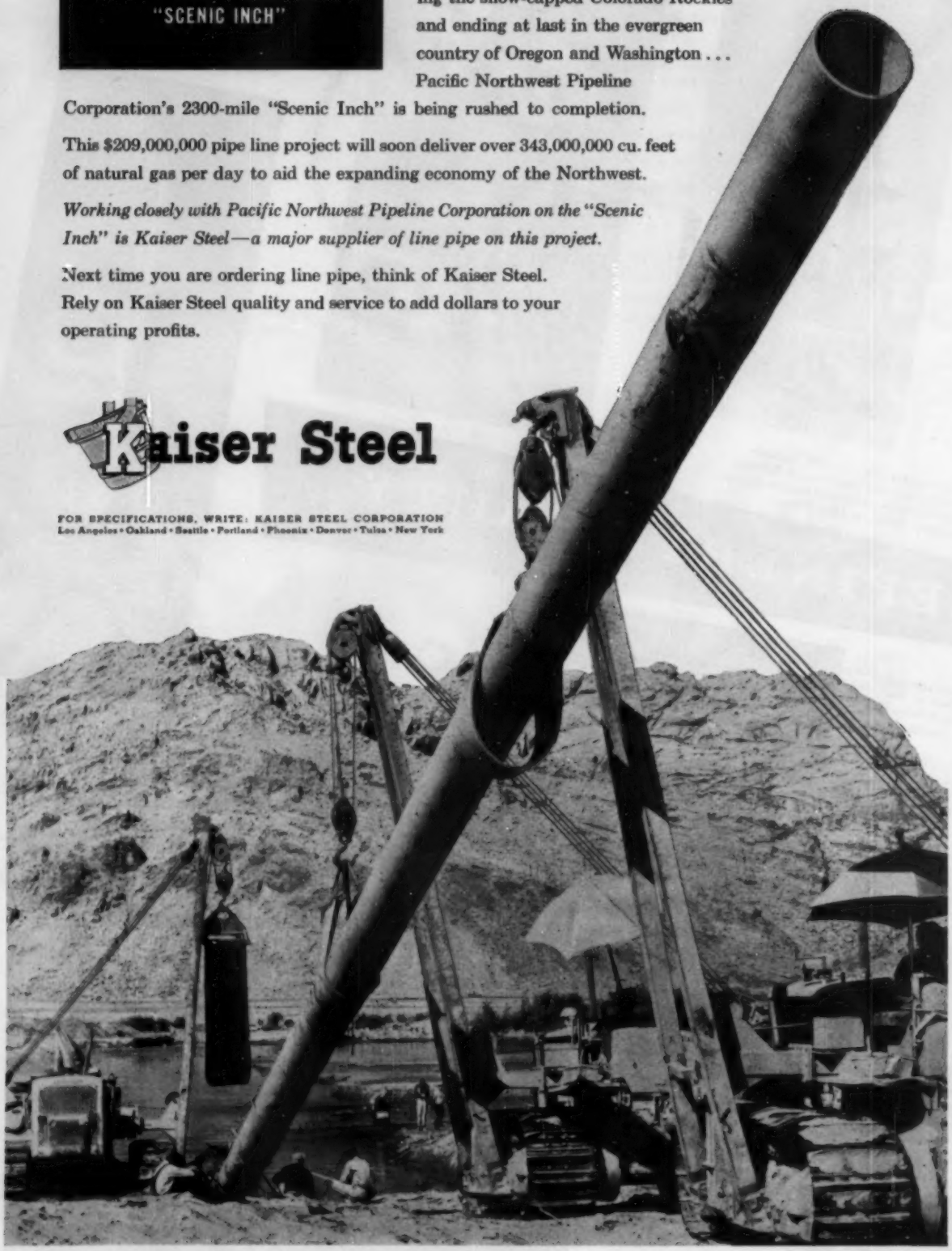
This $209,000,000 pipe line project will soon deliver over 343,000,000 cu. feet of natural gas per day to aid the expanding economy of the Northwest.

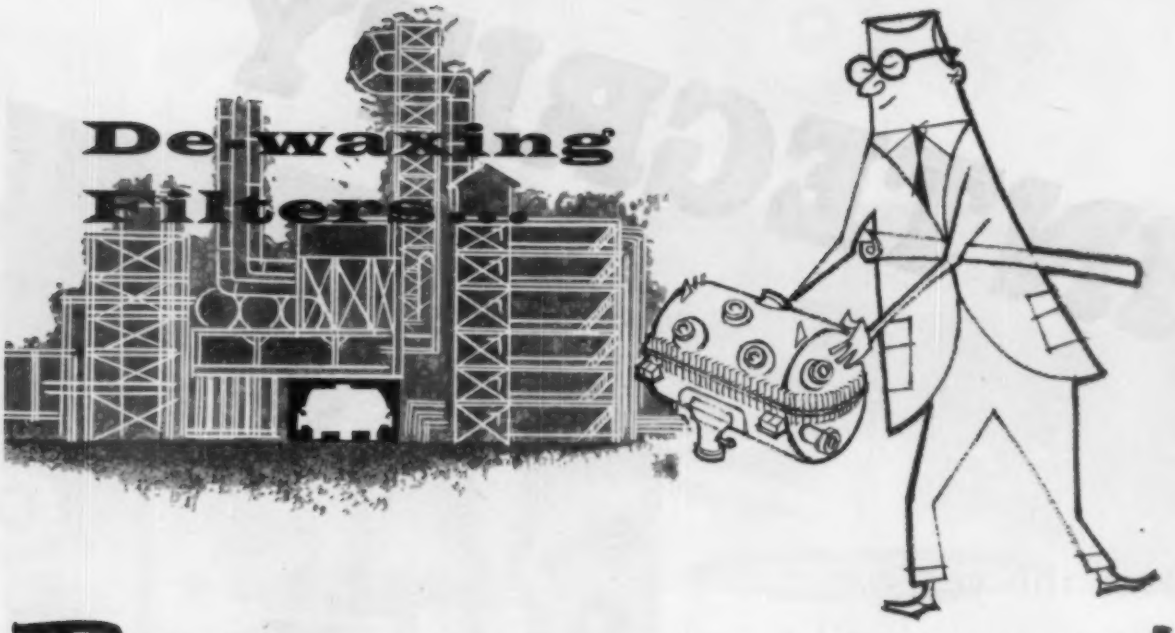
Working closely with Pacific Northwest Pipeline Corporation on the "Scenic Inch" is Kaiser Steel—a major supplier of line pipe on this project.

Next time you are ordering line pipe, think of Kaiser Steel. Rely on Kaiser Steel quality and service to add dollars to your operating profits.

Kaiser Steel

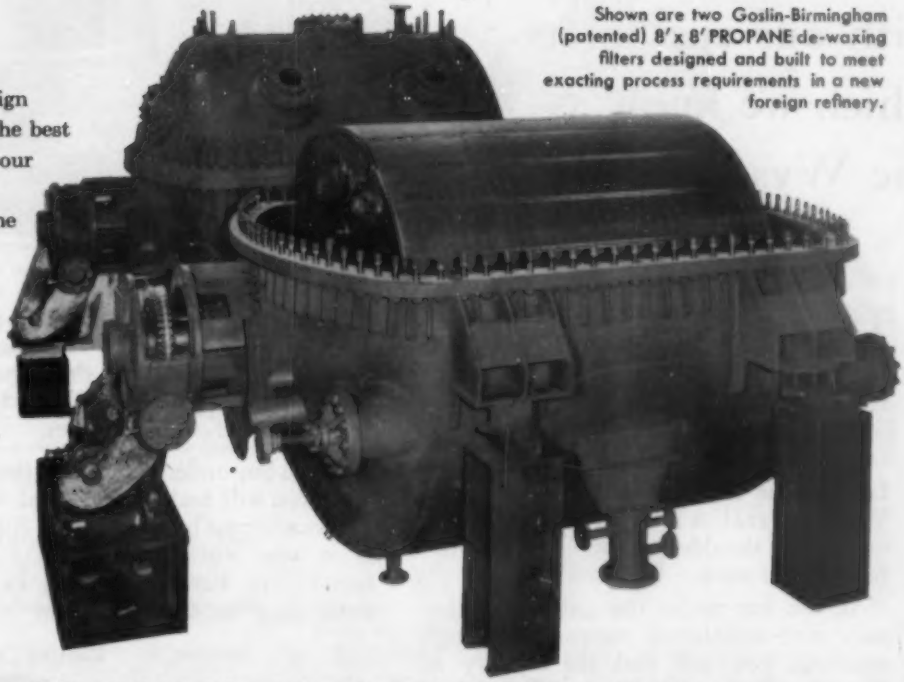
FOR SPECIFICATIONS, WRITE: KAISER STEEL CORPORATION
Los Angeles • Oakland • Seattle • Portland • Phoenix • Denver • Tulsa • New York





To fit your requirements!

Goslin-Birmingham manufacturing and design know-how assure you the best de-waxing filter to fit your requirements, whether for the MEK or propane process. G-B has the engineering and fabricating experience gained in the manufacture of more de-waxing filters than any other producer . . . by many times the largest volume in the industry.



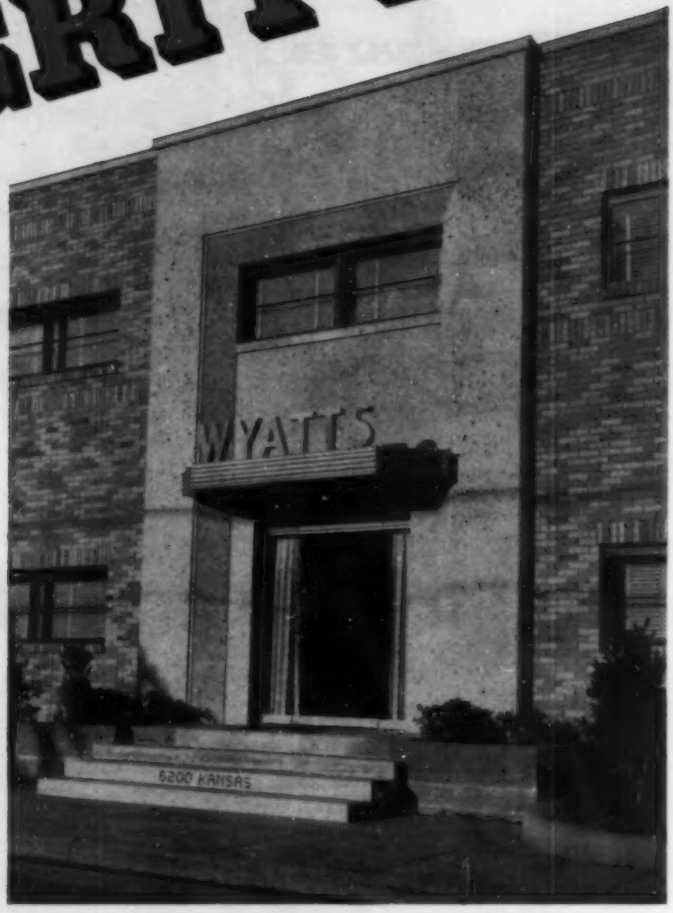
Shown are two Goslin-Birmingham (patented) 8' x 8' PROPANE de-waxing filters designed and built to meet exacting process requirements in a new foreign refinery.

Call or Write G-B for engineering consultation at no obligation.

GOSLIN-BIRMINGHAM MANUFACTURING CO., INC.

BIRMINGHAM • ALABAMA

INTEGRITY



Over the years
we have established
a relationship
with our customers
which we know as
the Wyatt Standard

If you buy under the code of strict compliance to every specification, you will find Wyatt Metal & Boiler Works fully willing and able to fulfill every requirement.

If you buy under the code of implicit faith in the manufacturer, you will find Wyatt Metal & Boiler Works fully capable of shouldering all responsibilities for finished work.

If you buy under the code of dealing only with established companies of high standing, you will find the capacity of Wyatt's plants more than sufficient and the capital structure of the company more than adequate.

If you buy under the code of friendliness and an appreciation of mutual problems, you will find the development of Wyatt Metal & Boiler Works parallel to that of the industries it serves.

If you buy under the code of the Golden Rule, you will find Wyatt Metal & Boiler Works as firm a believer in that Rule today as it was when this organization was founded in February, 1913, in a little metal shop on Coombs Street in Dallas.

MANUFACTURERS AND ERECTORS
SINCE 1913

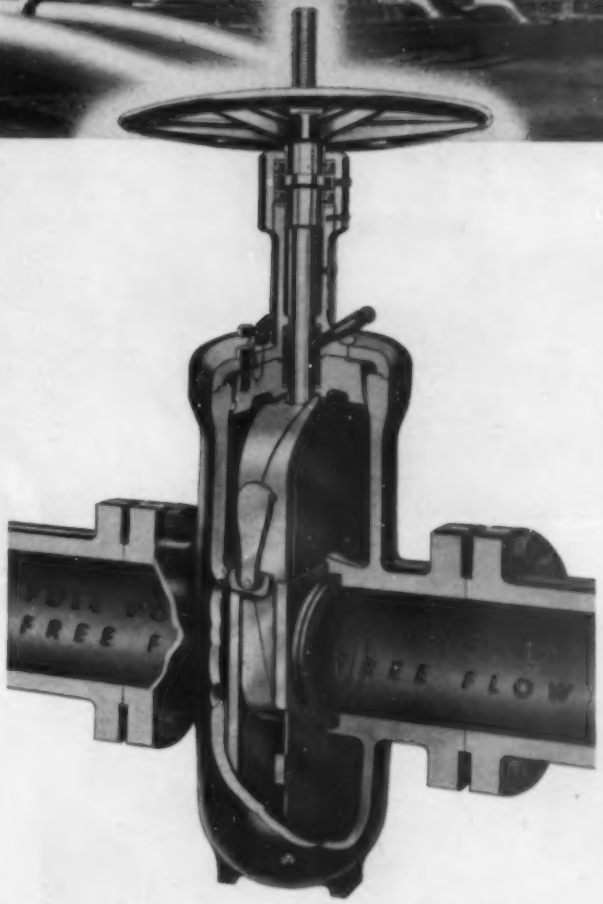
FULL VOLUME FREE FLOW
ALL THE WAY

W-K-M
Through-Conduit Valves

Main lines with W-K-M Valves all the way are the "expressways" of pipeline transportation. The smooth bore through a W-K-M Valve is the same as the I.D. of the pipe and permits the same full volume, free flow as the pipe itself, and allows no more pressure drop or turbulence than an equivalent length of smooth wall pipe. Pump or compressor power is concentrated on transmission — not wasted overcoming obstructions. Scrapers may be run freely through the valves when cleaning the line.

Other advantages of W-K-M Pipeline Valves that contribute to their efficiency in service on the line are Leverlock Control of the parallel expanding gate; pressure seal bonnet that seals tighter as pressure increases; renewable seats; Superfinished stems, ball bearing operation for easier opening and closing under any conditions.

Write or ask your W-K-M Representative for our new pipeline catalog No. 300.



W-K-M MANUFACTURING COMPANY, INC.
A SUBSIDIARY OF ACF INDUSTRIES INCORPORATED
PLANT: MISSOURI CITY, TEXAS ● MAILING ADDRESS: P. O. BOX 2117, HOUSTON, TEXAS

MANUFACTURING

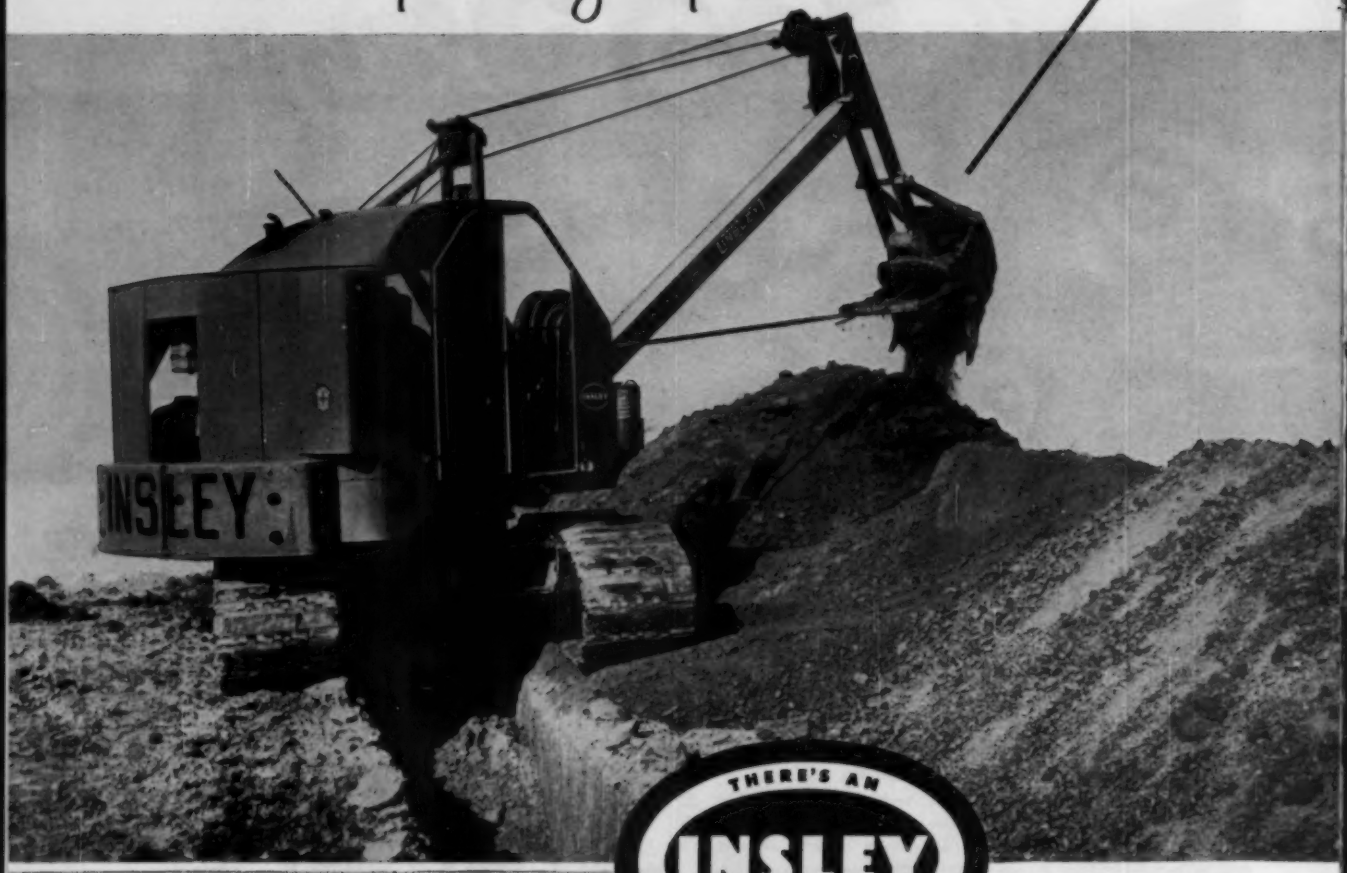
W-K-M THROUGH-CONDUIT GATE VALVES

acf LUBRICATED PLUG VALVES

KEY RETURN BENDS AND FITTINGS

the INSLEY "pipeliner"

...as requested by Pipeline Contractors



THERE'S AN **INSLEY** WORKING NEAR YOU

The Insley "Pipeliner" is the hard-working answer to the contractor's need for a machine especially designed for pipeline work . . . a machine with "built-in" durability and stamina that will withstand the severe operating conditions of cross-country pipelining.

- **New, wide, deep carbody with removable bottom cover plates**
- **Crawler rollers and tumblers sealed against dirt**
- **Two-speed travel (optional) through two-speed transmission .8 M.P.H. and 1.6 M.P.H.**
- **Increased stability and flotation with 12'-6" crawlers and 24" or 30" shoes**
- **Long wearing, heat-treated, alloy steel crawler shoes and pins**

The "Pipeliner" is fully convertible for hoe, shovel, dragline, clamshell and crane work, and is available with gasoline or diesel power. See your Insley distributor for full details or write direct to Insley.

INSLEY MANUFACTURING CORP. • INDIANAPOLIS, IND.

***Wholly owned subsidiary* / THE MAXI CORP. • LOS ANGELES**

VISCO
REG. U.S. PAT. OFF.
OIL TREATING
507
COMPOUND
55 U. S. GALLONS
VISCO PRODUCTS CO. Inc.
HOUSTON, TEXAS

No. 1 on the List

for small forged steel gate valve jobs

CHAPMAN LIST 960

You'll find more Chapman List 960 valves on more jobs than other small forged steel gate valves. For standing up and keeping maintenance costs down it's tops, by far, on the valve man's preference list. The reasons are sound and several.

Wedge gate faces are super hard . . . hardened to 800 Brinell by Chapman's exclusive Malcomizing process. They won't . . . *they can't* seize or gall. Easily replaceable seat rings are hardened stainless steel. Wear on seating surfaces is brought to a minimum. Bolted follower on the outside screw rising stem type has no exposed threads on its yoke . . . nothing that's easy to corrode.

Made to take . . . and stand up under . . . pressures from 380 psi at 1000° F. to 2000 psi at 100° F. (For higher ratings use Chapman List 990 valves.) Sizes from ¼" to 2" in many different alloys. You can have either rising stem with yoke or rising stem with inside screw. And, depending upon your needs, the Bonnet joint is either ground metal-to-metal or gasketed.

Catalog 10 has full information. It's required reading for men interested in valves. Write for your copy today.

THE CHAPMAN VALVE MANUFACTURING CO.
INDIAN ORCHARD, MASSACHUSETTS

Clean sweeping lines grace Cities Service's New Jersey products laboratory now under construction. Courtesy Cities Service

A kite or a kettle isn't enough any more . . . To be a scientist you have to be armed with fantastic tools — atomic "guns" that shoot nuclear particles, electronic "brains" that calculate faster than thought, microscopes that enlarge 100,000 times . . .

Research Has Old Mysteries in a Spin!

Ernestine Adams*

RESEARCH is the soul of modern industry. It is the imagination that leaps into the unknown and then builds a model around an idea found there.

It comes in basic and applied. Basic research is a prosaic name for discovery of natural phenomena. It often comes outside the formal laboratory — Ben Franklin watched a kite fly and James Watts saw steam come from a kettle. Those things had happened many times before but these two men grasped a new meaning in ordinary events.

Applied research is putting the fundamentals of physical truths to use — building a model around the fact.

Nearly everyone does it — that is, applies research. Most of the progress made in the petroleum industry until recent years came from the men working in the oil fields and the refineries. The U. S. Bureau of Mines had one of the few early laboratories devoted to petroleum research.

It was after World War II that impressive sums were set aside for research and this was mostly by the largest oil companies. Now even small companies may be working on some kind of research. Some industry associations are supporting research projects.

*Management Editor

The fundamental research program of the American Petroleum Institute is supporting a number of major projects in varied fields. It also makes minor financial grants to aid in specific petroleum research projects.

When the American Association for Oilwell Drilling Contractors set up a drilling research project, one Kansas operator was delighted. "We've been riding on big company research long enough. It's time we add something ourselves," he said.

A fairly recent development is organizations that give research service. You give them the problem and they undertake to give you an answer — for a fee.

Cost of overall industrial research in U. S. in 1955 is estimated at about $5 billion. The petroleum industry invested some $225 million, or less than 5 per cent of that.

Some 500,000 persons are employed in research. A rough guess of the number in petroleum would be 18,500. At least half of these are scientists, engineers, and technicians.

The plant — laboratory and equipment — for petroleum research is being built at a high rate. New research tools — electronics and atomic energy — have spurred the building.

Problems that looked insurmountable only yesterday are fed now to giant computers that can do a million mathematical computations a minute while a man at a desk calculator does a half a dozen.

A new research tool shoots atomic particles at materials and reveals the changes that take place. Rocks "age" in days where it would normally take millions of years. Molecules separate and re-form to make new and different materials. Plastics, for instance, can be made harder than ever before.

Where does this venture into more research lead us?

One thing it leads to is tougher competition. You have to be in there researching to keep up. Some of the investment analysts point out that the best future belongs to the companies doing the most research.

Of course, this isn't necessarily true. There can be uneconomic research. Probably no department of any company is harder to manage and assess. Or harder to staff in the first place. A perfect research man may be a burr in personal relations. You just can't find enough people with heads in the stars and feet on the ground who are easy to get along with, too.

But a well-staffed, well-managed re-

Laboratory just completed of Richfield Oil Corporation at Anaheim, California. *Courtesy Richfield*

search department is uranium in the safe.

For all of us — as part of the petroleum industry and as consumers — research leads to a better, more convenient life. It leads to long-range stability of our industry, upgrading our basic material to new and better products and at the same time improving methods for more efficient operations.

It leads to a lessening of physical burdens for the consumer — to better-run homes and factories and cars. To energy used to good effect. To better utensils and detergents, medicine and food, clothing and housing.

For the consumer it leads to more of our most precious possession — time.

To get an idea of the growth and direction of petroleum research let's take a look at the additions of new centers and expansion of present laboratories.

CONSTRUCTION

A new production research and development laboratory was opened by Sun Oil in 1955 at Richardson, Texas. This consolidated geological and other research work which had been conducted in various locations. The new laboratory, north of Dallas, is equipped with the latest electronic devices.

A radiation and tracer laboratory for application of atomic energy to petroleum research is being built by Sinclair at its Harvey, Illinois, research center. The new laboratory will use the most powerful source of gamma ray radiation installed thus far in any private industrial laboratory. It will be used to investigate the effects of high level radiation on processing methods and finished products.

A new engine and road test laboratory was completed by Ashland Oil and Refining at Ashland, Kentucky, as part of the company's research program pertaining to gasoline and diesel fuels.

At the Phillips Research Center in Bartlesville, Oklahoma, a chemical research laboratory building will be completed this year.

Standard Oil of Ohio will begin this year construction of a $2,400,000 research center near Cleveland, Ohio, which will increase their research staff and facilities.

The Texas Company has completed the country's largest privately-financed gas turbine fuels laboratory at its Beacon, New York, research center. In another modern engine study a free-piston engine has been installed at Beacon and fuel and lubricant tests are under way. Present construction at the Beacon center calls for completion soon of a special nuclear technological laboratory and a new analytical and testing building. The floor space of the administration building was recently doubled by the addition of a new wing. Also a new analytical laboratory has been completed at the company's Port Arthur, Texas, refinery.

A new atomic radiation laboratory was completed by Jersey Standard at Linden, New Jersey, and construction began on other research facilities there. At Abingdon, England, and at Baton Rouge, Lousiana, Jersey was enlarging laboratories and equipment.

Construction began on a research laboratory near Cranbury, New Jersey, by Cities Service. It will include facilities for studying application of radioactive energy to all phases of operations as well as product development and improvement. This is the sixth laboratory in the Cities Service system.

Ohio Oil Company's new research center was completed this year. On an 80-acre tract, 11 miles from Denver, Colorado, it provides laboratory and administrative facilities where all phases of petroleum research can be covered. At first special emphasis will be on exploration and production.

Work was completed at the end of last year on Richfield Oil Corporation's research center at Anaheim, California, 27 miles from Los Angeles. The center was set up far enough away from the Long Beach refinery so that research and development activities would be completely separate from routine laboratory work done at the refinery.

An automotive products laboratory was completed by Gulf Oil at its research center at Harmarville, Pennsylvania. Also added were a nuclear science laboratory to develop atomic energy applications and a production research laboratory for additional research in drilling, production and transportation operations.

A unique building completed during the year at Ponca City, Oklahoma, provides needed pilot plant facilities with additional laboratories and office space at Continental Oil Company's refinery. A surplus 800,000-barrel oil storage tank forms the framework of the building which is used chiefly for research and experimentation in petrochemicals.

A new laboratory was completed by Standard of Indiana at Seymour, Indiana, for the solid propellants projects. This work is for the United States Air Force and is already being conducted successfully on a pilot scale. Construction is scheduled for late summer on a new technical service laboratory at the Whiting, Indiana, refinery.

IT is difficult to tell you exactly what is being done in various fields in the petroleum industry. Industrial research.

Entrance to Sun Oil Company's new production research and development laboratory. *Courtesy Sun*

like Government research is under wraps. But here are some items, which are directional more than detailed.

Most of the information comes from annual reports where, generally, items of considerable importance to various companies are reported. These listings, however, do not always include the large continuing research projects so vital to broad progress.

Architect's drawing of Ohio Oil's Denver Research Center recently completed. Courtesy Ohio

EXPLORATION

Sinclair has developed geophysical exploration equipment employing the latest electronic devices. Seismic data can now be recorded in the field on magnetic tape and projected on to a television screen for study, or fed into an electronic computer for mathematical evaluation. Of course, most large companies and several geophysical service firms have made advances in this field.

A new logging tool for surveying an oil well by measuring the velocity of sound waves sent to underground geological formations has been licensed by Magnolia and Socony Mobil. The company also is applying nuclear physics to the study of geological formations encountered in the search for crude oil.

At Shell's Exploration and Production Research Division a new method of continuous electrical profiling for offshore exploration has been developed. Work on the chemistry of clays has assisted in the development of improved methods for estimating the hydrocarbon content of underground formations by means of electrical logging.

"Displacement Logging" is the name given by Atlantic Refining to a new electric well logging method. It is designed to give a direct indication of the presence of flowable oil in underground formations, another valuable tool in the search for oil. Displacement logging will be licensed to Halliburton as one of their commercial well logging services.

One company continuing basic research on the study of processes which form oil pools was Carter Oil (Jersey Standard). Investigation of oil migration and accumulation in recently deposited sediments furthered this research. One project improved techniques for isolating microfossils.

Development of a profile printer for better interpretation of seismic data was one of Gulf Oil's achievements. Progress was made in application of modern mathematical theories to the analysis of geophysical data utilizing a digital computer and the field use of geochemical methods for recognizing and evaluating petroleum source beds.

DRILLING

Magnolia (Socony) has a new drilling fluid which allowed them to drill a deep wildcat in the Gulf Coast area last year, even after encountering the highest temperatures — above 400 F— that ever have been recorded by the industry in drilling.

Carter Oil continued work on a new system of drilling and developed a core barrel for recovering poorly consolidated formations by enclosing the core in an elastic sleeve.

With increasing depths of wells and more interest in marine locations, engineering requirements have become more exacting. To meet these needs, Shell has formed an engineering department for immediate and long range research.

Humble Oil made progress with more efficient techniques of oil well completion which is said to have reopened the possibility of drilling wells of smaller diameter in certain areas with considerable saving in cost.

Studies by Humble showed perforations are often partially plugged but innovations made in the operation resulted in clean perforation and thus better flow.

Another Humble project was developing an oil emulsion cement slurry that improved cementing practices. It will set rapidly when treated with salt solution.

PRODUCTION

Although South Penn Oil used various commercial laboratories instead of one of its own, the company reported progress in the study of producing horizons and methods for increasing recovery per acre.

Sinclair reported encouraging field tests of its patented underground heat wave process for releasing crude oil not recoverable by conventional production methods. Testing on a commercial scale is going on at present.

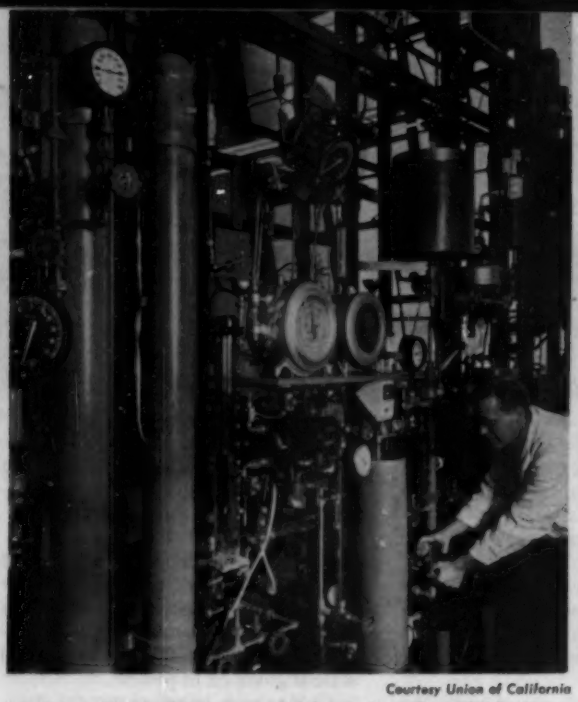
Gulf expects to pay particular attention to maximum utilization of gravitational forces in oil recovery and the development of profitable methods for increasing recovery of heavy crudes by heat.

Magnolia and General Petroleum (Socony Mobil) are engaged in research and commercial scale testing of "insitu combustion" as an oil recovery process.

A method for increasing recovery from oil sands through partial combustion of the oil underground is undergoing field trials in culmination of several years of research efforts by Standard of California. It is hoped that these field tests will supply important information as to the economic feasibility of this process and on methods of solving the technical problems involved in its application.

Teams of Carter research engineers tackled actual field problems of oil reservoirs in the United States, Canada, Venezuela and the Near East. The objective here was to tie research

Analog computer was added to Sohio's research facilities in 1955. Courtesy Standard Oil (Ohio)



Courtesy Union of California

Scientist working in Union's research laboratories at Brea, California.

Courtesy Atlantic Refining

Pilot plant reservoir control for high pressure gas injection process.

closer to actual field conditions to assure greater ultimate recovery.

Jersey Standard affiliates worked on a production method that called for dissolving liquified gases in underground oil to reduce its viscosity and surface tension so that more could be covered. Another method involved heating the reservoir for the same purpose.

Union of California continued studies in secondary recovery of oil through bottom hole heating, water flooding, gas pressuring and combustion drive.

One major development in the production phase is the Atlantic Refining high pressure gas injection process. It has been in successful operation in one of the company's West Texas fields and a second application has been made in a Louisiana field.

Continental is conducting basic studies on new or improved methods for decreasing the volumes of crude oil left in underground reservoirs under the best of present production practices.

TRANSPORTATION

Gulf reported that its emphasis on transportation research was aimed at greater automation in crude oil transfer and pipe line operations and at decreasing internal corrosion of tankers.

One of Atlantic's products, a certain type of asphalt, is being used as a major component of a product for insulating and protecting pipe lines used to transmit steam and hot fluids.

REFINING

There are now 23 units built or planned for Ultraforming, Standard of Indiana's new method of improving the octane quality of gasoline. Ten of these Ultraformers are for royalty-paying licensees. The company also is looking into possible ways of using atomic energy to influence hydrocarbon conversions.

Gulf made several process improvements to increase production of high octane gasoline including conversion of volatile low octane to high octane components. Advances were made also in methods for upgrading residual stocks and hydro-treating other fractions. Future research will include application of nuclear energy in refining and petrochemical processing.

Richfield has a detailed design for commercial units to process phthalic acid. A market study indicates good prospects of profitable application.

Cities Service centered research activities in the process field on a new catalyst and the development of new refining methods.

Esso Research and Engineering Company began experiments in 1955 to use atomic energy for refining crude oil and manufacture of petrochemicals. Early work produced new materials which may find application as improved additives for lubricating oil or as petrochemicals. An improved platinum catalyst process called "Powerforming" has reached the commercial stage. It can produce very high octane components of motor fuels. Improvement was made on the Fluid catalytic cracking operations also.

The first commercial Hyperforming" unit for gasoline reforming was completed successfully by Union Oil of California and licensed to another oil company.

Atlantic's new patented "Catforming" is in operation under license at 16 refinery units here and abroad and more are being built. The company has a new process called "Pentafining" for improving the octane number of low boiling gasoline components by isomerization.

The rigid polyethylene process developed by Standard Indiana has been licensed to Eastman Kodak for commercial production. Polyethylene produced by this process is high melting and not affected by boiling water. It is expected to be used in food packaging and in manufacturing unbreakable household and industrial products.

Shell reports development of three new chemical processes. The first two yield hydrogen peroxide and acrolein and the third yields glycerine as a derivative of these. Shell expects to improve equipment design and refining processing from tests in plant units using radioactive traces which "tag" the process stream or the catalyst. Better processing of heavy oil stocks have come from basic studies of oil composition and properties. Much attention has been given to hydrogenation and dehydrogenation as refinery processes, and several new types of catalysts to promote the desired improvements in oil structure have been found by Shell.

Phillips went after more useful catalysts and catalyst systems for a number of commercial applications in the field of plastics, rubber, protective coatings, isomerization, and dehydrogenation.

Kerr-McGee research department contributed to the development of the uranium process used at the Shiprock, New Mexico, mill.

Socony Mobil is building units at its Paulsboro, New Jersey refinery and at the Bremen, Germany, refinery of an

Courtesy Esso Research & Engineering

Scientists in "pit" adjoining cave holding radioactive cobalt pipe.

Courtesy Standard of California

Isophthalic, kin to nylon, was dreamed up, developed and produced.

affiliate, to use hydrogen to reduce sulfur content and otherwise improve the quality of home heating oils, diesel fuels, and other distillates. This same research group has investigated the use of hydrogen in treating lubricating oils and in catalytic cracking of distillates and residual fuels. This process produced a new jet fuel that meets the quality demand of supersonic aircraft.

One of the foremost accomplishments of Sinclair was the commercial development of a new catalyst used to treat distillate fuel oils with hydrogen to improve their stability and remove unwanted sulfur. A process developed by the company to make improved lubricating oil additives was put into commercial use at Houston. Texas. Sinclair installed three units using a platinum catalyst process for making high octane fuels. Baker and Company, Inc., platinum specialists, who participated in the development, is licensed to manufacture it.

PRODUCTS

A new automotive gear lubricant was developed by Pure which shows promise of superior service under the most difficult climatic conditions.

Sinclair has a new wax for milk cartons which gives an improved appearance. The United States Air Force approved a new jet engine lubricant developed by the company. A rubber processing oil put on the market in 1955 is used by the rubber industry to expand the supply of synthetic rubber, Sinclair reports.

Champlin introduced a motor oil design to prevent sludge formation under cold crankcase conditions as well as hot operating conditions.

Continental Oil made wide advances in detergent materials and is constructing additional facilities for manufacturing one new detergent component developed during 1955.

Research on plastics led Standard of Indiana to a new low cost resin for the floor tile industry and to interesting new developments in the polyethylene field. New lubricating oils for railway diesel engines solved the difficult problem of simultaneously protecting both copper-alloy and silver bearings against corrosion. Insecticides that kill the new DDT-resistant strains of insects were being developed by Standard Indiana.

New type torque converter fluids, hydraulic and turbine oils and cutting fluids were added to Cities Service industrial and automotive lubricants and greases last year.

Gulf developed two semi-fluid oils for textile machinery, two anti-wear and anti-rust greases for business machines, and an improved detergent oil for locomotive diesel engines.

New uses for Butyl rubber developed by Esso Research were found in the successful production of Butyl latex suitable for tire cord dipping. Esso also improved a multi-purpose grease for industrial use which is expected to replace as many as 100 different grades of grease now being manufactured.

In cooperation with a railroad company, Union of California worked out a operation by means of a dual-fuel system permitting use of more economical fuel. Demand for a new wax developed by Union for coating milk cartons ran ahead of supply.

A new super-dispersant motor oil was introduced by Sohio.

A chemical formulation to improve gasoline performance and effectiveness in high compression automobile engines was developed by Skelly.

Phillips' work on polyolefin resins has developed to the stage where the Marlex plastic is expected to be on the market before long. It is one of the hardest substances known.

A new line of greases based on new concepts of grease composition and manufacture was placed on the market by Standard Oil of California. The company developed new uses for Oronite Isophthalic to broaden the industrial use and support the sale of this odor-free substance used in paints, plastics and as a plasticizer. The company says it is a cousin to du Pont's Dacron.

Several promising new insecticides, fungicides, herbicides and soil fumigants were screened in the agricultural research division of Shell Oil and are now in field trials. One is an improved nematocide, the other is a phosphate type insecticide. New forms of resins are being produced by Shell which show excellent properties under extreme conditions of use. Certain forms show promise for creaseproofing and shrinkproofing of textiles.

PERSONNEL

The growth of research centers has created a new demand for scientists and engineers. Ohio Oil Company with its new research center speaks of an intensive recruiting program at the leading scientific and educational institutions for qualified scientists. Of the 100 persons needed, 75 were scientists and engineers.

Conoco mentions 300 scientists, technicians and clerical employees directly engaged in the company's re-

search and development program.

Personnel for organic research was added to the Richfield center last year.

Standard of California reported that of their 1200 men and women engaged in research, half have technical degrees.

Number of persons engaged in Jersey Standard research rose to a total of 2800 in 1955.

EQUIPMENT

Equipment comes into the research picture both as a tool of research and as a result of research.

Equipment for research centers is more complex than it has ever been and, of course, provides the most accurate solutions.

At the Socony Mobil laboratories at Dallas, Texas, a Van de Graaff accelerator is being installed for the study of subsurface geological formations. It is a two-million electron volt unit and another one will be installed in the new nuclear research laboratory at Princeton, New Jersey to provide high energy electrons, protons, and X-rays.

On the other side of the picture, Socony Mobil grants licenses for manufacture and sale of its engine analyzer, an electronic instrument for quick and accurate diagnosis of automotive engine ailments. This was originally developed by the company's engineers as a research tool, but it was found to have wider application and is now being made available to improve automobile servicing for the public.

During 1955 the first industrial linear atomic accelerator on the East Coast was placed in operation at Atlantic Refining's Philadelphia research laboratory. This electron gun, capable of operating at more than one million electron volts, shoots atomic particles into petroleum hydrocarbons at speeds up to 600 million miles per hour.

Gulf's apparatus evaluates potential source beds by gamma ray analysis. *Courtesy Gulf*

Shell has Van de Graaff accelerators at Houston and at Emeryville.

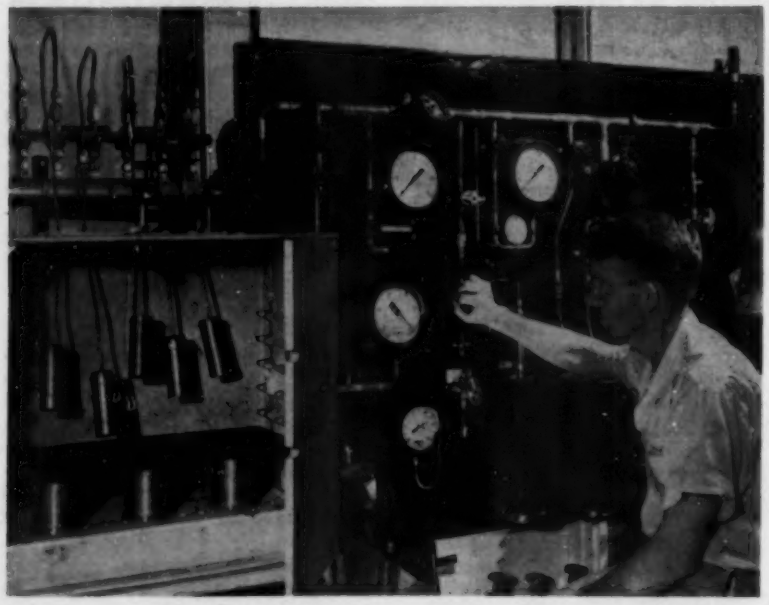
An analog computer was added to the Sohio facilities last year.

Standard of Indiana reported that its engineering research proved the value of electronic digital computers in doing the laborious work in setting up refining and production schedules. Complex control and operational problems were solved with the new electronic analogue facilities.

Carter Oil developed an experimental magnetic tape seismic recorder with office play-back equipment in geophysical research. Use of the magnetic tape allowed more accurate mapping of underground structures.

A loading arm capable of filling a gasoline tank truck and simultaneously collecting the vapor which would otherwise be displaced to the atmosphere was developed by Union of California. These vapors have been considered by some scientists to be air pollutants. Union is now using a number of these devices in Los Angeles.

One research program of Honolulu Oil Corporation completed in 1955 was a new process and the mechanical equipment for large scale assembly line defeathering of fowl. It has been introduced to the fowl processing industry with great success.



Constructing gamma ray detector, which was developed at Texaco's Bellaire lab. *Courtesy Texaco*

ECONOMICS

If your company plans a research center it must build a new building and fill it with costly tools that do fantastic tricks. It must find those rare devoted scientists who are creative and at the same time very practical.

The director plans a hundred projects and if one is very successful, the company is lucky. You'd think research was improbable to begin with and too expensive to invest in under any circumstances.

But it pays off like a long-shot should. Raymond H. Ewell, of National Science Foundation, estimates the annual average return on research investment runs 100 to 200 per cent over a long period. One oil company estimated 160 per cent returns a year on research expenditures over 10 years.

If it's feasible, no company will turn down that kind of investment. It looks as if research has entered a new and promising growth period. ★ ★ ★

First store of National Supply was one at Cygnet, Ohio, (left), opened in 1894. One of the latest is the Corpus Christi, Texas, store (above), a good example of the modern supply store.

P 944.

What the Supply Store Can Do for You

The modern store is the best point of contact between the oil industry and the supplier . . . It's an exposition of 10,000 different items of equipment, a clearinghouse of information . . . It contributes to the profitability of the industry . . .

Arthur W. McKinney

THE point of regular, personal contact between oil field buyer and oil field seller is at the oil field supply stores. It is chiefly by our stores that we suppliers are judged.

Now, some of the older supply outlets in our industry are not exactly noted for their glamor or their modernity. When you look at such a store, you may find it hard to remember that it represents a multi-million dollar corporation which is regularly and honorably mentioned in the columns of the Wall Street Journal. The oil field supply company can perhaps be compared to an iceberg — four fifths of it is hidden from public view. The part that cannot be seen is the foundation that supports everything else, but the smaller part that shows—the stores—is what counts with our public.

To understand present oil field store operations, I think it may be helpful to recall a few facts about their history. The oil field store, of course, is something unusual in the American economy. I know of few other industries where a large manufacturer sells his own products through scores of his own retail stores and acts at the same time as wholesaler and retailer for hundreds of other manufacturers of thousands of products. But that is the standard practice of about one-third of the nation's 800-odd oil field supply stores.

These stores and their mode of operations were born almost a century ago and developed in a fantastic atmosphere of boom or bust. In the early years new stores were opened and old ones closed almost faster than the home office could keep track of them. Today there is a certain level of orderliness and controlled development. We still have to close a store occasionally in a declining field, but when we open a new one in a development area we usually have assurance that it will be around for quite a while —long enough, at any rate, to enable us to make a fair return on capital investment. That is one of the results of our scientific sales research.

Early Stores

The National Supply Company's first store was opened 62 years ago at Cygnet, Ohio. It was typical of many of our early stores. A picture of it that we treasure shows a two-story frame building next to a railroad track. It had a porch. It had a false front to make it look bigger than it really was. The road in front of the

*Taken from "A New Look at the Oil Field Supply Store," presented by Mr. McKinney before the Petroleum Industry Buyers Group, National Association of Purchasing Agents, Cleveland, Ohio, May 22, 1956.

building was dust in good weather and mud in bad. The store personnel lived on the premises. Equipment and supplies were piled high around the sides and back of the store.

Incidentally, our first shipment of inventory to Cygnet never reached the store. It was grabbed up by eager operators at the depot.

This picture was repeated wherever oil was found in the early days—in Pennsylvania, Ohio, Kansas, Indiana, Oklahoma. One of the greatest rushes of all time, of course, was near Beaumont, Texas, in 1901. Captain Lucas' Spindletop flooded the countryside with more than a million barrels of oil before his well was brought under control. There was more oil from one well in 10 days than the whole state of Texas had produced in any previous year. The oil was still running along the railroad tracks when the first carload of our equipment arrived for the Beaumont store. A month later the store was supplying hundreds of operators in the area. They were drilling wells so close together that the derrick logs overlapped, and they joked in the fields that if you lost a drill string in one well at Beaumont you could fish it up out of the well next to it.

Everybody wanted to use the equipment rather than sell it, and so it was impossible to staff the store properly. Our few Beaumont people had to work round the clock, snatching an occasional nap on a cot in a corner. There was no time for creative salesmanship or market research. In fact, the terms weren't even born.

In many of the early fields, the supply store was the first building to go up. They often became the center of community activities. They served as post offices, employment agencies, hotels, and even as hospitals. One of our early Oklahoma stores had the only bathtub in town.

As a matter of fact, these primitive conditions lasted somewhat longer in a few fields than we like to think. I well remember the store we established in the early 1930's in Kevin, Montana. It was an establishment with a residence attached, and in the residence was a nice bathtub. The only trouble was, there was no water in Kevin. After a number of such bathroom fixtures had been bought and installed, the townspeople discovered that they had built their town on solid rock. It would have cost a fortune to blast for water and sewer lines, and since it drops to 30 degrees below zero on some days, the pipes obviously could not be laid on the surface. Result: no water. The last time I was in the Kevin store, they were using their bathtub for small fittings and fixtures.

The Author

Arthur W. McKinney, president of The National Supply Company, Pittsburgh, began his career with the company as a salesman in 1920. He became general manager of sales in 1938, executive vice president in 1948, and president in 1954.

Mr. McKinney was born in Olean, New York, and is a graduate of Allegheny College, Meadville, Pennsylvania. He is a member of the board of the American Petroleum Institute and is a past president of the Petroleum Equipment Suppliers Association. He has served two terms as president of the Diesel Engine Manufacturers Association.

A lieutenant in the U. S. Army Signal Corps in World War I, he served in World War II as a member of the Industry Advisory Council of the Petroleum Administration for War, and of the Materials Subcommittee of the Petroleum Industry War Council.

The oil field store has changed. The tool pusher has his own shower now—a shower with running water—and is generally accustomed to finer things than were available in earlier days. Oil drilling has become a bigger, more scientific, and more sedate venture, although certainly no less risky or enterprising than it was. The automobile and modern highways have brought the oil field closer to town.

To serve this changing industry, the supply business has also had to change. For one thing, it has a far greater degree of stability and permanence than it used to have. You will all agree that this is so; but perhaps you have noticed, as I have, a tendency in our industry to doubt it when some new development, some revolutionary new discovery or invention, comes along. Believe me, that is not a brand new idea. Let me tell you a story to show what I mean.

First Texas Store

Back in 1899 the S. M. Jones Company opened a store in Corsicana, Texas. Although they are now a dignified and reputable manufacturer, at that time they were also in the supply business. Theirs was the first store in Texas.

Many of you probably remember Percy Jones, a brother of Mason Jones, the present head of the S. M. Jones Company. As a young man, Percy Jones was sent to Corsicana to take over the job of store manager. Shortly after opening the store and making his first sales, he sent his father, Sam Jones, the following wire: AM CLOSING STORE AND SUGGEST YOU CLOSE SHOP IMMEDIATELY. THEY ARE LIFTING OIL BY COMPRESSED AIR.

His father replied: STAY WHERE YOU ARE AND KEEP THE STORE OPEN.

The S. M. Jones Company is still in business and doing very well.

The Modern Store

Another changing aspect of the supply business is in the store itself. The modern supply store is becoming a scientifically managed merchandising enterprise. This, of course, does not happen from one day to the other. Some supply stores may still remind you, at least in their outward appearance, of the days of Spindletop. Many others look as modern as any part of the fine new shopping centers which greet you on the outskirts of Cleveland. All in all, there has been a modest revolution in the oil field store, and as a result, a considerable advance in its service and functions.

In line with this transition, we at National Supply, as well as our competitors, have been conducting an intensive store modernization program. The foremost aims of the program are: faster and more efficient service to our customers; more pleasing appearance of the stores themselves; and cost reduction through streamlining and standardization.

A typical new store might be described like this. It is a low, one-story building of modern lines, with plenty of window space. It has no front porch and no false front. It is situated on one of the main highways on the edge of an oil town. There is ample parking space. Attached to the store is a corrugated iron warehouse with at least 5000 square feet of floor space. The buildings are surrounded by one or two acres of storage yard.

When you enter the store, you find modern show cases, fluorescent lighting, padded bar stools in front of the counter, and perhaps a coffee bar in one corner for your convenience.

You will find the merchandise attractively displayed in the showcases, on the shelves, and in the window. In the store itself this would normally be smaller items in steady demand, such as hand tools, paint, flashlights, electric bulbs, rig cleaner, and safety helmets. The bulkier merchandise is stored in the warehouse. Other products, such as heavy machinery, are stored in the yard. We even have steel pipe there from time to time—when we can get it.

Each store tries to cater to the special demands of its area. In the

warmer climates, the store is likely to be air conditioned. In one area which happened to be a center for uranium prospecting, we had Geiger counters just inside the front door. In mosquito-infested areas we carry a heavy stock of bug killers; and in the Far North, special anti-freezes and starter fluids.

You will also find that the store serves as an oil field library. Give-away literature is usually displayed in a handy rack. The permanent store catalog includes a vast store of information relating to oil well drilling and operation. In producing fields, a repair shop for downwell pumps is usually attached to the warehouse.

Such a store is staffed by a store manager, his assistant, several sales clerks, warehouse men, field representatives, repair men, drivers, and clerical help. In the district and division offices, the store would have the services available of product specialists, credit experts, and other specialized personnel. Often special services are rendered by headquarters people.

Interior view of the National Supply store at Corpus Christi, Texas.

Visit Your Supply Store

If you haven't visited one of the newer stores, I hope you will make a point of looking one over on your next field trip. Perhaps you will be surprised at how much they have changed. Whether it is my own company's store or one of our competitors, I should like very much to hear your ideas on what you see. We both need to know what you think of our work—to know if this is the kind of job you think we should be doing for you.

If you do think we are on the right track, I want to ask you to do something more. Most of you know me as a salesman, and you realize that I cannot speak for twenty-five minutes without trying to sell you something. I want to sell you an idea—a thought—a little reflection, you might call it.

I want to ask you to stop and consider whether you and the other people in your organization concerned with buying from us are using our type of facilities as advantageously as you might. I ask you to study whether it would not profit you to make more and better use of our stores.

It's an Exposition

My request is based solely on the conviction that the field store has a service to render your industry above and beyond the simple function of supplying you with machinery, supplies and pipe—or even Geiger counters. Times have changed, to be sure, but I believe that the store should and must continue to perform some of the very useful and unusual functions that it has been performing in the past.

For instance, a big field store will carry from 10,000 to 12,000 different items in its inventory. Some of these will be new; others will be old with new improvements. These can be seen on the shelves or in the warehouse. Some of them are selected and shown on special display racks in the front of the store. In fact, it is not too much to say that the store itself is a kind of perpetual Oil Exposition.

The service we render here is technical and trade information. We let you know what is what in oil field equipment. But how will your people—and by that I mean your field crews and your tool pushers—how will they know what is available, what new changes have taken place, if they do not visit the stores to see for themselves? How will they find the new and improved products that will help them do their job better? No field representative can possibly carry such equipment with him, nor can he possibly give the tool pusher or the driller what they can get in the way of information and service in the stores themselves.

It's an Information Center

A second special service rendered by the store is to act as a general clearinghouse of information. It is a place where your people can go to keep current with the news; to get and exchange oil field information; to transact business; to make some telephone calls; to meet their friends—in other words, a place they can use as a business headquarters when they are in town. If they want to buy something, that's all right, too. We won't refuse it to them, if they feel they really need it.

If you agree with what I have said, you may want to ask your people in the field if *they* agree. And if they do agree, then you may want to encourage them to make more use and better use of the facilities we have built for them.

It's a Point of Contact

We will continue to make each store as pleasant as we can. We will keep on doing what we can do best: to make it as easy, attractive, and profitable as possible for the purchaser to come to us, to view the exposition of the equipment industry that is found daily in the oil field supply store.

As you all know, the oil industry has just passed through the busiest and most productive year in its history. We have reason to believe that oil consumption in 1956 will be even higher. All we will have to worry about is who gets the business, and how to get it at a profit.

With the increasing size and complexity of the oil industry, investments and risks have increased tremendously. And it has become increasingly difficult to insure a fair return on the capital invested.

I feel, however, that each of us—we, the suppliers, and you, the purchasing agents—occupies a key position that permits us to contribute greatly to the overall profitability of the industry.

By working together smoothly in the future, as we have in the past, we shall make it possible for the operator and producer to get the best equipment, at the right time, at the right price. ★ ★ ★

What is it?
Why is it important?
How is it completed?

Depreciation

With the advance of industrial technology and the consequent expansion of fixed assets, this subject is vital to the petroleum industry . . . Some of its economic and financial implications are discussed here . . .

John E. Arens

THE dictionary defines depreciation as a lessening of price or estimated value. One could hardly realize the true significance and importance of this subject from so innocuous a definition. Yet few factors have a more profound effect on the financial welfare of a business. Depreciation is a basic fact of life which must be understood and reckoned with in our daily business decisions.

Depreciation is particularly important in industries with highly mechanized operations and a consequent large capital investment. The petroleum industry is typical of this category. Its capital investment runs into many thousands of dollars per employee, and depreciation is commanding steadily increasing sums of money running into billions of dollars per year.

Depreciation is also important, because it plays an important part in whether or not operations are profitable, it has a significant effect on the size of the bill for income taxes, and because its influence is such that it is almost always a factor in intelligent decisions regarding alternative courses of action.

Obsolescence and Other Factors

There are several factors which can affect the accuracy of depreciation forecasts. One of these is obsolescence. The obsolescence factor can have a marked bearing on the amount of depreciation expense we incur. It can be particularly important in petroleum refining equipment, because the petroleum industry is continually improving its refining technology. But it also is a prevalent factor in drilling equipment, production equipment, transportation equipment — in fact in all major segments of the petroleum industry. We must constantly be alert to new developments and take this factor into account in estimating depreciation expense.

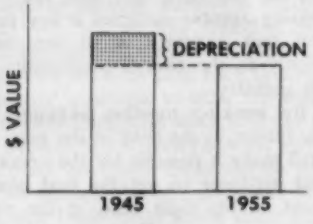


FIG. 1

Errors Can Be Costly

Now what happens when we fail to make a correct allowance for depreciation? If we estimate depreciation too high, we understate the earning power of a piece of equipment, an operation, or an entire company as the case may be. On the other hand, if we underestimate depreciation, we get an exaggerated idea as to the earning power. Moreover, we find that our income tax bill is higher because of the overstatement of earnings, and cash, which might be profitably employed, is drained from the business. Improper consideration of depreciation can lead to inaccurate valuations affecting our decisions with regard to purchases, sales, replacements of equipment, and various alternative courses of action upon which the future of the business depends.

It becomes apparent, therefore, that depreciation is an inexorable force that is everywhere around us, working even while we sleep. It must be understood and reckoned with — successful operation depends on it.

Four Basic Concepts

Depreciation is an item of far-reaching importance to business, and is largely a function of the two factors of time and usage. Before proceeding into some of the more involved aspects of the subject, let us pause to reconsider the meaning and definition of depreciation.

Actually, the term has many meanings, but those meanings which relate to business considerations stem from four different basic concepts. They are:

1. **Decline in value**
2. **Amortized cost**
3. **Appraisal concept**
4. **Impaired utility**

It is important that we understand these concepts and their relationship to practical business considerations.

1. Decline in Value. Consider first the decline in value concept. At the outset we encounter the problem of what is meant by value. Value is another of those words which have several interpretations. For example, value can mean value to the user or market value, the latter representing the value to others. The decline in value concept of depreciation refers to either value regardless of how it is determined — by the actual sale price, by appraisal,

The Author

John E. Arens is a corporate financial consultant with offices in Los Angeles, California. He received his bachelor's degree in economics from Princeton University and a Master of Business Administration degree in finance from New York University.

Following experience in the banking and investment business in Wall Street, he headed the economics and financial research activities of a major oil company. In addition to his consulting activities Arens is president of Leasing Service Company, Inc., which engages in lease-financing of industrial and municipal facilities.

EXCLUSIVE

or by any other reasonable method.

In other words, this concept merely considers the value of a given asset, such as a building or an item of equipment, at two different times. No distinction is made as to the causes of the decline in value. They may be external, such as a decline in the general price level, or they may be internal, such as physical deterioration. Fig. 1 provides a simple illustration of this concept in that it shows the decline in value of a given asset between two dates.

This is probably the most common concept of depreciation. In general, it is applicable primarily when considering the sale of an asset, for the difference between the original cost and the potential sales realization (that is, the decline in value) determines the amount of actual depreciation which will be incurred by the seller. We are all familiar with the usually disproportionate decline in value (depreciation) we incur if we sell a new automobile after merely taking it out of the showroom and driving it around the block. This is a rather extreme example, but it serves to illustrate an application of this concept of depreciation.

2. Amortized Cost. The amortized portion of the cost of a fixed asset is the accounting concept of depreciation. It arises through the systematic writing off of the cost of the asset less salvage value against income over a period of time representing its estimated useful life. This is illustrated by Fig. 2, which shows the increase in the amortized cost as a function of time.

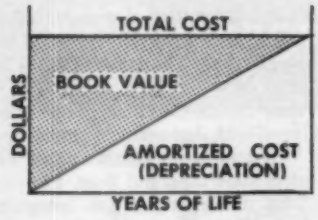


FIG. 2

It should be emphasized that this concept has no relationship to market value whatsoever. This concept reflects a process of valuation of the asset wholly within the business enterprise; it is not a market process. Expressing this another way, we might say that it is an apportionment process whereby original cost less the salvage value, if any, is spread over the useful life of the asset so as to charge a portion against each year's income.

The importance of this concept stems from the fact that it is the accepted method for determining the net income of a business and for calculation of its income tax liability. The calculation of, and systematic provision for, depreciation according to this concept enables a company to maintain its capital intact and to provide the funds needed to replace assets when they reach the limit of their useful life.

There are many different methods for allocating the cost of a fixed asset to each year of its estimated useful life. The most common is the straightline method whereby a flat percentage of original cost, less salvage value is written off each year. For example, if a fixed asset has a useful life of 10 years, one-tenth of the difference between original cost and salvage value would be charged against income each year.

Actually this method of calculating annual depreciation may not accurately reflect the decline in market value of a given fixed asset. Some assets decline more rapidly in the early years of their lives and at a more moderate rate toward the end of their lives. This comparison is illustrated in Fig. 3. The straight line portrays the decline in the so-called "book value" where straight line depreciation is used, while the curved line reflects the decline in market value.

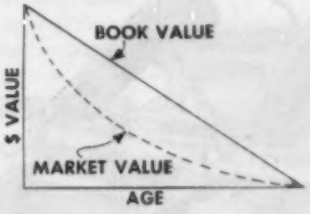


FIG. 3

This concept of depreciation which we call "amortized cost" has many ramifications, because there are various accounting and legal aspects, particularly with respect to income taxation, property taxation, the preparation of financial statements, the public sale of securities, the listing of securities on the exchanges, etc. Furthermore, the development of income tax law has become so complex as to require the services of tax experts in all large organizations, and the magnitude of the tax aspect frequently makes it the deciding factor in business decisions.

The Revenue Act of 1954 has introduced changes in the law respecting the calculation of depreciation for purposes of determining income tax liabilities. The new law permits a more rapid amortization of fixed assets than was heretofore permissible.

3. Appraisal Concept . . . According to this concept, the value of an existing old asset is measured by appraising it in comparison with the most economical new asset which would perform the same service. The old asset would ordinarily have such disadvantages as shorter remaining life, larger required outlays for maintenance, etc. Appraisal depreciation should include an appraisal of all of these disadvantages expressed as a difference in comparative value. This concept is illustrated by Fig. 4.

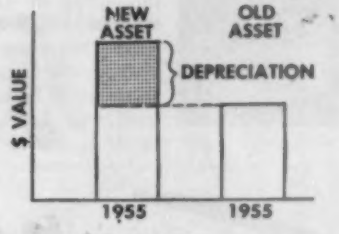


FIG. 4

4. Impaired Utility. This concept of depreciation is one about which much confusion exists. The confusion frequently stems from the thought that if one asset is as serviceable as another, it is worth just as much. Often this is far from the truth. Value decreases, that is, an asset depreciates, for many reasons, such as reduced life expectancy, increased maintenance costs, the development of more modern designs, etc. But its utility may be equal to that of any other asset of the same type.

On the other hand, there are cases of reduced utility which result in a reduction of value. Machines which have lost their ability to perform close tolerance work constitute a typical example. Sometimes a loss of utility can be avoided by adequate maintenance. Thus, there is a relationship between the amount of maintenance expenditures and the rate of depreciation of some assets. But regardless of the amount of maintenance, most fixed assets eventually reach the end of their useful life, and this usually occurs before the asset has ceased to function physically and crumbled away.

Exercise of Judgment

It should be clear from the foregoing that it is insufficient just to talk about "depreciation" in considering business problems. Judgment must be carefully exercised to the end that the proper concept of depreciation be considered. Each of the concepts described above has its place in the scheme of things; each is valid for a particular purpose or in a particular situation. Where depreciation is an important factor, correct business decisions depend upon the selection of that concept of depreciation which is applicable to the case at hand. ★ ★ ★

(278) Stainless Steel Needle Valve

New 416 stainless steel needle valve designed for corrosive service and suitable for pressures up to 10,000 psi has been developed by James P. Marsh.

Constructed throughout of 416 stainless steel, these valves are considered by the manufacturers to be the answer to dependable, safe, and accurate control of many corrosive fluids over a wide range of service requirements.

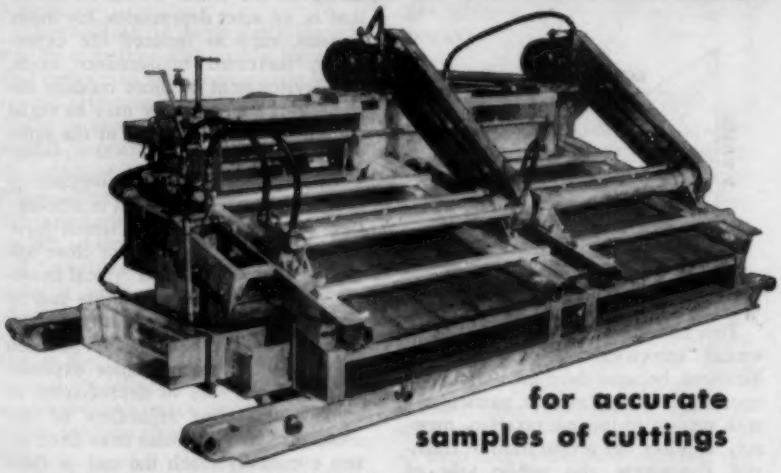
Deep-chambered threads are machined to extra long length permitting even undersized pipe threads to make up tightly. Another advantage of deep-chamber threads is that the possibility of restricted flow due to pipe ends coming too close to inlet and outlet ports is entirely eliminated.

Packing used is of special durable quality called "Marpak," tailor-made to fit the extra deep-packing space provided on all Marsh Needle Valves. This packing is exceptionally clean and easy to remove and install.

Marsh Instrument Company.

Thompson

DOUBLE VIBRATING SHALE SHAKER...and SAMPLE MACHINE



for accurate samples of cuttings

The THOMPSON SHALE SHAKER SAMPLE MACHINE offers the operator and geologist one of the best methods available for obtaining accurate foot-by-foot samples of well cuttings.

This THOMPSON DOUBLE VIBRATING SHALE SHAKER and SAMPLE MACHINE is specially engineered for off-shore barges or islands, deep wells, or wells using big volume and high pressure mud pumps. It is available either plain or galvanized, which makes it rust and deterioration-proof on off-shore or coastal duty.

THOMPSON Shakers are famous for their highly efficient service at any depth or flow and for their economical first cost.

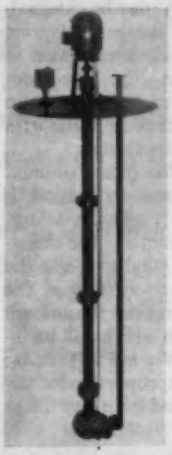
Make sure THOMPSON'S on the job for accurate samples and clean mud.

SOLD ONLY THROUGH SUPPLY STORES

Thompson TOOL CO. IOWA PARK TEXAS

(292) A New Weapon in Fight Against Corrosive Liquids

For years industry has waged a battle against the deteriorating and costly results of pumping corrosive liquids.



It is a well-known fact that ordinary metals such as cast iron and bronze have little chance of longevity when heavy salt solutions, certain chemicals, and liquids containing abrasives are being pumped. After a short time, pump impellers begin to wear, tolerances become greater, and pump efficiency decreases until capacity and head can no longer be controlled. It is at this point that industry's maintenance costs ascend very sharply.

Without a doubt, all of these pump maintenance costs will never be completely eliminated, but it was recently reported that Southern Engine and Pump has taken a long stride toward this end with its development of a stainless steel vertical sump pump. It is said that all metal parts below the sump cover plate are of type 316 stainless steel or better with the exception of the shaft, which is carpenter 20 steel. Teflon shaft bearings spaced 3 ft 4½ in. Apart are machined to close tolerances and are equipped with individual self-oiling lines to prevent scoring and excessive wear. The strainer is ¼ in. stainless mesh.

These Southern Pumping Units equipped with Automatic Control Type C F W floatswitch—weather proof with stainless steel tape and float. Powered by 2-hp motor and drives connected by Falk 4F steelflex coupling.

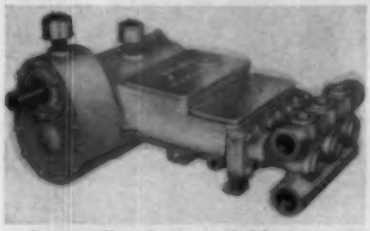
The critical initial tests on these pumping units are reported to have been in pumping out salt domes for butane storage. Since then, their acceptance and use has been established. The superior corrosive resistant qualities claimed for these pumping units is now being utilized in some of the industries worst corrosive areas and conditions with exceptional results.

Southern Engine and Pump Company.

For more information on this equipment, see Page E-20a.

(286) Triplex Plunger Pump Line Introduced

Designed for many different services with an exceptionally wide range of operating speeds, the TP-3 Bethlehem 2¼ x 3 Horizontal Triplex plunger pump has capacities from 170 to 1500 BPD and a pressure range of 900 to 1490 psi.



Outstanding feature of this compact pump is the Bethlehem controlled gravity-flow lubrication system that assures positive flood lubrication at all speeds through a system that is said to guarantee complete dependability. Filling the crackcase with the proper lubricant is the only requirement to assure adequate lubrication for extended trouble-free operation. The oil chest affords quick and easy access to the plunger jam nuts for easy removal. Its sturdy construction provides maximum strength with minimum weight. Definitely a space-saver, the pump is approximately 39 in. long, 28 in. wide, and 16 in. high. It weighs 730 lb. The 2½-in. suction provides adequate opening for easy filling of the pump and the 2-in. discharge may be piped out either direction for easy field installation.

The TP-3 fluid ends are available in molybdenum allow iron, cast steel, and aluminum bronze, along with complementary fittings selected to handle various fluids continuously with a minimum of operating expense. Plungers can be furnished of hardened steel, stainless steel and solid ceramic. With the proper selection of fluid end and plunger material, the pump offers a very low cost on a dollar per barrel basis of fluid pumped whether it be on water flooding, salt-water disposal, crude oil gathering, or refinery products.

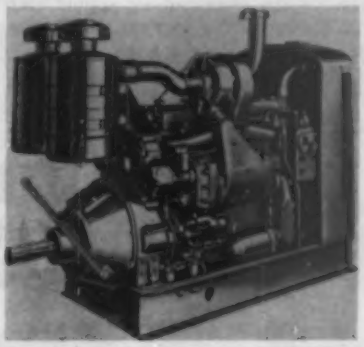
An optional gear reducer, easily installed in the field, is available with a 2.71:1 ratio, being adaptable for right or left-hand drive. This permits the use of standard oilfield engines and motors.

Bethlehem Supply Company.

(289) Turbo-Super Charged Diesel Line Announced

Detroit Diesel Engine has announced three turbopower engines as additions to its series 71 line of industrial two-cycle diesels. Presently available are four- and six-cylinder fan-to-flywheel engines and a six-cylinder base-mounted power take-off unit.

The four-cylinder engine has a rating of 171 basic hp at 2300 rpm. The "Six" is rated at 236 basic hp at 2100 rpm. Because of their compact size in relation to horsepower and their better fuel



economy, engines are also ideally suited for use as replacement power in on- and off-the-highway trucks. Both fan-to-flywheel engines weigh approximately 9½ lb per horsepower.

Exhaust-driven turbine and air impeller team up with the engine-driven blower to increase the scavenging air supply and the pressure at which it is

Handiest Locations in PITTSBURGH

Hotel Pittsburgher
PITTSBURGH, PA.
Diamond Street below Grant

Right in the heart of the Golden Triangle—Hotel Pittsburgher

400 outside rooms with bath. Large-screen television and radio at no extra charge in every room. Air conditioning. Two restaurants. *ATlantic 1-6970*

Hotel Pittsburgher MOTEL

Opposite Greater Pittsburgh Airport on Airport Parkway west. 56 air-conditioned rooms with large-screen television at no extra charge, tile bath, private phone. Courtesy car to and from motel. *AMherst 4-5152*

a Knott Hotel

JOSEPH F. DUDDY, GEN. MGR.

New Model 5 VIBRASWITCH MALFUNCTION DETECTOR T.M.

● PREVENTS COSTLY DAMAGE

. . . by monitoring vibration or "roughness" of operation. ANTICIPATES TROUBLE and prevents costly damage. Available with control unit which ignores starting vibration and temporary disturbances.

APPLICATIONS

- Pumps and motors.
- Cooling tower fans.
- Compressor and blowers.
- Gas and diesel engines.
- Turbines.
- Any rotating or reciprocating equipment.

THE BETA Corporation
FOREST AVENUE AT RIDGE ROAD
RICHMOND 26, VIRGINIA

delivered to the cylinders. This results in higher air-to-fuel ratios which in turn contribute to increased horsepower and better fuel economy. Horsepower is further increased since the air impeller supplementing the air supply to the cylinders helps reduce the amount of horsepower required to operate the engine-driven blower.

Changes have been made in the cylinders of turbopower engines to take care of the increased air supply and the corresponding increase in exhaust gases. The air-intake ports are larger in size and extend to a higher level on the cylinder liners. This permits a greater charge of air to enter the cylinders and allows the ports to remain open for longer air-intake periods.

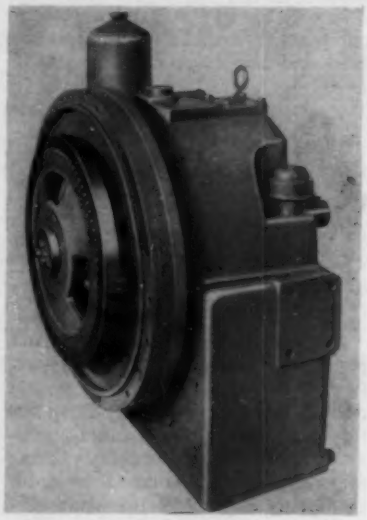
A fast and complete discharge of exhaust gases in turbopower engines has been attained by increasing the number of exhaust valves in each cylinder from two to four. Turbopower units are additions to the Detroit Diesel line providing a wider selection of horsepower ratings.

Detroit Diesel Engine Div., General Motors Corp.

(291) New Single-Stage Torque Converter

Production of a new line of single-stage torque converter has been announced by Twin Disc Clutch's Hydraulic Division.

Addition of the new single-stage units complements the manufacturer's line of three-stage torque converters and fluid coupling drives.



The new 1500 Series Torque Converters are for engines producing from 30 hp at 1150 rpm and 198 hp at 2400 rpm. Specific torque ratings are 165, 200, 240, 285 and 330 lb-ft, depending upon the impeller blading selected by the user.

Differing from other single-stage torque converters currently being marketed, the new Twin Disc unit features "unloading" of the engine through an exclusive blade design wherein the turbine develops a counter-head that stops fluid circulation at high-speed ratios. This not only simplifies construction by eliminating commonly used free-wheeled stators, but also eliminates possible field failures from the use of such devices.

Another important design feature is that impellers having different bladings (both number of blades and pitch) are interchangeable. Thus the converter's torque capacities can be matched as accurately as possible to engines of various horsepower outputs and speeds, within rated limits, without requiring changes in the converter housing or other components.

Primarily, the new line of Twin Disc Single-Stage Torque Converters was designed to help make available from one manufacturer a complete line of torque converter and hydraulic couplings for industrial service. This single-stage unit takes its place in this line for such applications as shovels, yarders, front-end loaders, bucket loaders, industrial lift trucks and others where single-stage torque converters prove to have certain advantages.

Twin Disc Clutch Company.

WISCONSIN-POWERED
Variable Controlled Pumping Unit

"Really Gets the Job Done"

The "quotes" are the enthusiastic comment of the operator when asked about the performance of this trailer-mounted pumping unit. He stated further that it was practically trouble-free, light in weight, and that he could always count on it for handling a wide range of jobs.

The Unit consists of a VG4D Wisconsin Power Unit direct-connected to a 2" rotary pump with a capacity of 14 BPH at 1000 lbs. and 70 BPH at 400 lbs. The Wisconsin Air-Cooled Power Unit is equipped with a heavy-duty transmission which has several speed ratios, reverse and neutral.

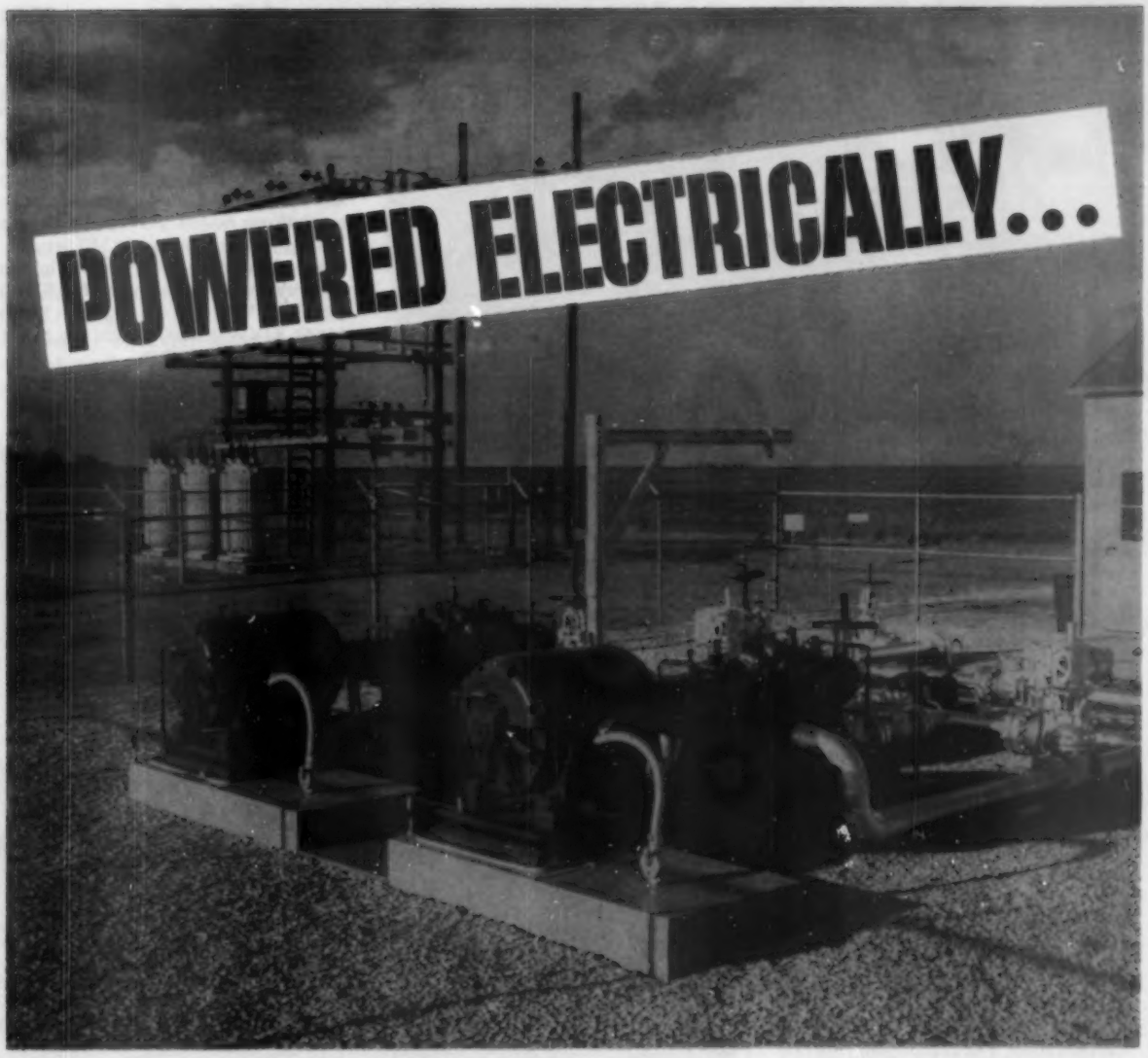
Shown here testing a pipeline in southern Oklahoma, this unit is also used to pump crude oil of various viscosities into pipe lines having a wide range of pressures.

This is just another typical oil field application of Wisconsin Heavy-Duty Air-Cooled Engine Power . . . extensively used for operating oil well pumps, gathering pumps, tar kettles, pipeline padding machines, standby power units, and many other kinds of oil field utility equipment requiring dependable power in a 3 to 36 hp. range.

You can't do better than to specify "WISCONSIN POWER" for *your* equipment . . . backed by *immediate service.*

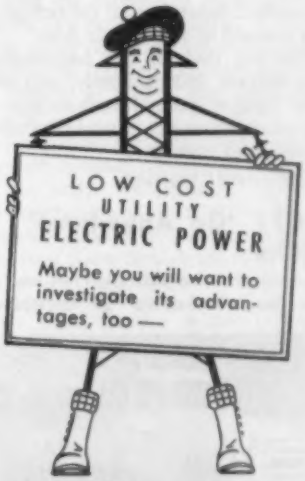
WISCONSIN MOTOR Corporation
MILWAUKEE 46, WISCONSIN
World's Largest Builders of Heavy-Duty Air-Cooled Engines

WRITE TO HARLEY SALES CO.
619 SOUTH MAIN STREET • TULSA, OKLAHOMA
3420 McKINNEY AVENUE • HOUSTON, TEXAS
905 SOUTH MAIN STREET • WICHITA, KANSAS
OIL FIELD DISTRIBUTORS FOR WISCONSIN ENGINES AND ALL TYPES OF UTILITY UNITS



. . . There's a BIG DIFFERENCE!

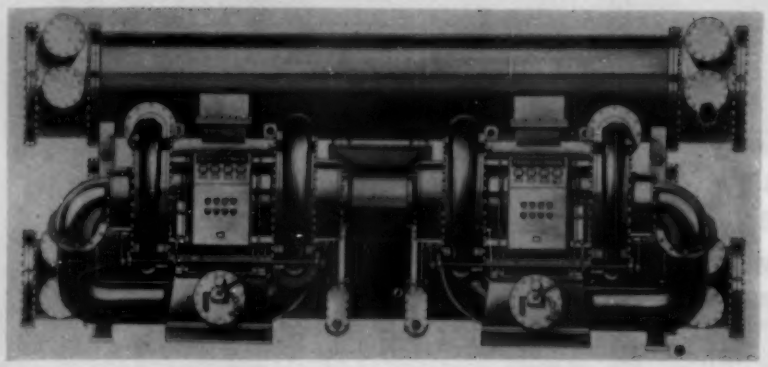
Whenever Low Cost Utility Electric Power is on the job ... you'll readily see the difference. Electric Power offers the operator a cleaner power source with the added advantages of LESS MAINTENANCE, LESS ATTENTION, and LESS MANPOWER. Automatic Remote Controls also mean greater efficiency... plus a more economical operation. Be sure of power when and where you need it... but be sure its Low Cost Utility Electric Power.



WRITE PETROLEUM ELECTRIC POWER ASSOCIATION, P. O. BOX 2771, DALLAS, TEXAS, OR CALL THE SALES ENGINEER OF YOUR LOCAL UTILITY ELECTRIC POWER COMPANY — NOW

Other Equipment

(297) Larger Air Conditioners



New "Duplex" compressor, water chilling units ranging in size from 800 to 1200 hp are being announced by Trane for air conditioning installations demanding high tonnage capacities. The compressors are located on the same side of a single, large evaporator and condenser.

These new units were designed and engineered so that all the features of Trane single-compressor CenTraVacs could be retained. These include capacity control, hermetic operation, minimum noise and freedom from vibration, automatic operation, positive lubrication, and gas-cooled motors.

Other features of the duplex chillers are lower current demand at starting, reduced costs, and stand-by capacity.

The lower inrush current demand during starting is possible because the unit's two motors are arranged to start in sequence. This is an important advantage, especially in areas where power companies, or other conditions, impose limits on the maximum allowable inrush current for motor start-up.

Duplex CenTraVacs offer economical operation. The compressors operate in sequence and can perform singularly or together depending on the refrigeration demand at any specific time.

The fact that the two compressors can operate independently, permits most types of general maintenance to be performed on either, while the other continues to operate.

The Trane Company.

(301) 'Go Anywhere' Trucks

International S-120 (4x4) is one of four four-wheel-drive "go anywhere" models in the line of light and medium-duty trucks manufactured by the motor truck division of International Harvester. The light-duty (gross vehicle weight rating 7000 lb) S-120 (4x4) is available in 115, 122, 127 and 134-in. wheelbases, with six and a half, eight, and nine-foot pickup bodies, and seven and a half or eight and a half-foot stake or platform bodies. Power plant is the 131-hp Black Diamond-240 engine. Other four-wheel-drive trucks in the International S-line are the S-140 (4x4), GVW 11,000 lb; the S-160 (4x4), GVW 15,000 lb and the S-164 (4x4), GVW 18,000 lb.

International Harvester Company.

LIKE COMPARING

A FOUR ENGINE AIRCRAFT

TO A SINGLE ENGINE AIRCRAFT

RIGELE

Plus These Added Features:

Interchangeability of Components — All generators used on RIGELECTRIC units are interchangeable. All of the heavy duty traction type electric motors are the same size. Multiple Engine Dependability — On the Model S241000 RIGELECTRIC power package, four 250 H.P. engines with a combined capacity of 1000 H.P. are used instead of using, as in some electrical arrangements, only one power unit to drive one or two generators. The Stewart & Stevenson multiple engine arrangement is far more reliable and dependable inasmuch as one power unit can be out of service for some reason and still the efficiency of the RIGELECTRIC unit is hardly impaired.

America's Newest and most Flexible

engine Electric drilling Rig power

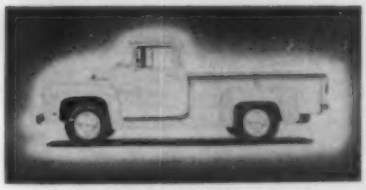
offers the Dependability of Four

engines instead of only one

(300) Long-Bed Pickup for Field Use

One of the prominent additions to the Ford Truck 1956 model lineup in current production is the long-wheelbase half-ton pickup with its high-volume body. This low-priced 8-ft pickup is available with either the 133-hp Cost Cutter Six (standard) or the 167-hp Power King V-8 (optional).

The new pickup body features what is said to be the highest cubic content available in the half-ton truck field. The 8-ft length of this body facilitates the loading of longer materials than allowed in other pickups and therefore has special appeal to the oil industry. The toggle-type tailgate latch is an exclusive with Ford and can be quickly and easily operated. This latch holds the tailgate clamped tight to rubber



cushion strips on the body sides and eliminates annoying tailgate rattles.

A choice of four optional transmissions in addition to the standard three-speed is offered, including Fordomatic and Overdrive. Available (at extra cost) are power brakes, side-mounted tire carrier, and dual tail lamps, which can easily be converted for use as directional turn signals.

The following chart gives the basic specifications of this model.

Maximum GVW	5000 lb
Wheelbase	118 in.
Axle, front-capacity	2600 lb
Axle, rear-capacity	3300 lb
Brakes—total lining area	179 sq in.
Body dimensions (inside)	
Length	96 in.
Width	54 in.
Height	22.1 in.
Capacity	65.4 cu ft
Engine—6-cyl	
Type	Overhead valve
Max. gr. hp	133 at 4000 rpm
Net hp	120 at 3900 rpm
Engine—V-8	
Type	Overhead valve
Max. gr. hp	167 at 4400 rpm
Net hp	143 at 4000 rpm
Frame—size	6.0 x 2.25 x 0.19
Section modulus	3.34
Springs, front—capacity	950 lb
Springs, rear (2-stage)—capacity, std.	1025 lb
Capacity for max. GVW	1350 lb
Tires	
Size, std.	6.70-15 4 Ply
Size for max. GVW	6.50-16 6 Ply

Ford Motor Company.

DESIGNED FOR THE OIL FIELD BY OIL FIELD POWER SPECIALISTS

AVAILABLE THROUGH RIG MANUFACTURERS AND SUPPLY STORES

RIG*

STEWART & STEVENSON

Simple Controls — The RIGELECTRIC control system does not require the use of contactors in the operational function. The control is so simple that it requires only a fraction of the normal amount of space. Trouble shooting is accomplished easily without the need of highly technical personnel.

Longer Engine Life with Less Maintenance Cost — Maintenance cost with Stewart & Stevenson RIGELECTRIC sets is much lower than the comparable life with the same engines on a mechanical driven rig due to the constant speed operation of the engines.

Reduced Fuel Consumption — The fuel consumption is lower with RIGELECTRIC because the engines are operating at their most efficient speeds constantly.

DIRECT PARTS AND SERVICE RESPONSIBILITY — Stewart & Stevenson is completely and fully responsible for the entire design, function and servicing of both electrical and engine components.

STEWART & STEVENSON SERVICES, INC.

Main Office and Plant: 4516 Harrisburg Blvd., Houston 11, Texas. Phone CApitol 5-5341

Branches: Corpus Christi, Dallas, Lubbock, San Juan, Odessa

Representatives: San Antonio, Longview, Brownsville, Tyler, Pecos

* "RIGELECTRIC" REGISTERED TRADE MARK FOR STEWART & STEVENSON DC DRILLING RIG POWER

(265) General-Purpose Gate Valves with Hard-Faced Seats

Henry Vogt has available general purpose gate valves designed with bolted gland; union bonnet outside screw and yoke — solid wedge gasket joint and hard-faced renewable seat rings.

Valve ratings are—150-800 lb service, 2000 lb Cold W.O.G.

These gate valves were intended to meet the demand for smaller, forged steel valves of lighter weight and shorter end to end dimensions while retaining the safety and ruggedness inherent in a wrought material. Available with screw end or socket weld ends, in sizes ¼ in. through 2 in, they are rated at 800 lb at 850 F and 2000 lb at 100 F.

Hard-faced seat rings, on 13 per cent chrome-trimmed valves, are expanded in the body. Wedges of 13 per cent chrome have a hardness of 500 Brinell. Packing gland studs and nuts are stainless steel. Stem threads are not exposed to service temperature.

	End to End Inches	Height Open	Weight Pounds
¼	2⅝	6½	2⅝
⅜	2⅝	6½	2⅝
½	2⅝	7⅝	4½
¾	3⅝	8¼	7
1	4	10⅝	10
1¼	4⅝	12⅞	17⅝
1½	5½	14	23¼
2	6¼	16⅛	36

Globe valves are also available with hard-faced integral seats.

Henry Vogt Machine Company.

(296) Steel Buildings Solve Space Problems

Rigid-frame type Armco steel buildings are reported to be a solution to large space problems in the oil and gas industry—from 1620 ft up.

First cost is low because of the economics of mass production. Erection is fast because of the ease and simplicity of joining the panels. There is a wide variety of building combinations for maximum flexibility of floor plan and layout. Buildings have straight, clean lines.

Exteriors can be left plain or can be painted. Special architectural treatment is possible. Interiors can be finished as desired, and standard Steelox partitions and panels are available.

The interlocking panel joints are weather-tight, and walls and roof can be insulated. All steel construction means there is nothing to warp, crack, rot or burn. Cost-per-year service is said to be low.

Clear-Span Widths vary from 40, 50 to 60 ft, and total width may be any number or combination of these spans. Lengths are unlimited, in increments of 20 or 32 ft (minimum 64 ft).

Shown is a rigid-frame Armco steel building under construction, showing frame structure and smooth-faced steel panels. When completed, it will consist of two 60-ft spans by 120 ft to form a structure 120 ft x 120 ft with 14-ft sidewalls.

Armco Drainage & Metal Products, Inc.

WHEELING
COUPLINGS
FOR OIL COUNTRY USE
LINE PIPE COUPLINGS A.P.I.
⅛" to 12" — Seamless — Black or Galvanized
PLAIN TUBING COUPLINGS A.P.I.
1" to 4" — Seamless
EXTERNAL UPSET TUBING COUPLINGS A.P.I.
¾" to 3½" — Seamless
CASING COUPLINGS A.P.I.
4½" to 13⅜" — Seamless — Long or Short
HYDRAULIC COUPLINGS
⅛" to 4" — Seamless
REAMED AND DRIFTED A.I.S.I.
¾" to 12" — Seamless
DRIVE PIPE COUPLINGS
6" to 12" — Seamless or Special Processed
Sales Offices in Leading Cities:
Albany, N. Y.—Albert L. Becker, 434 Clinton Ave.
Baltimore, Md.—William H. Thurlow, 2301 No. Charles St.
Chicago, Ill.—Harry A. Jay, Suite 1090, Old Colony Bldg.
Denver, Colo.—Earl H. Jones & Co., 1863 Wazee St.
Detroit, Mich.—R. W. Lang, Jr., 505 Park Avenue
Erie, Pa.—R. J. Maggi, Box 711
Falmouth, Mass.—Walter S. Bennett, 53 Minot St.
Houston, Texas—Henry H. Paris Distributor, Inc., Box 932
Independence, Mo.—Craig A. Fross, 3701 Norwood
Los Angeles, Cal.—James A. Riordan Co., 1400 Santa Fe Avenue
Louisville, Ky.—Sid. Schultze Co., 514 W. Main St.
Milwaukee, Wis.—W. G. Nelson, 3347 N. 97th St.
Norberth, Pa.—J. W. Worthington, 105 Forrest Ave.
Newark, N. J.—Ira L. Rothenberg & Assocs., 398 Market St.
New York, N. Y.—Max Rothenberg, 11-05 38th Ave., Long Island City
Omaha, Neb.—Wm. Freiden, Central States Engineering & Sales Co., 5101 Blondo St.
Oswego, N. Y.—Northeastern Associates, Inc., Neil Chatterton, Secretary, P. O. Box 284
Portland, Ore.—Earl H. Jones & Co., 1233 NW 12th Ave.
Richmond, Va.—P. C. Abbott & Co., 15 E. Franklin St.
St. Louis, Mo.—Walter C. Dollinger, Dollinger & Lucas, 1047 Big Bend
San Francisco, Cal.—Earl H. Jones & Co., 1150 Folsom St.
Seattle, Wash.—Earl H. Jones & Co., 819 Thomas St.
TOP QUALITY Since 1918
WHEELING MACHINE PRODUCTS COMPANY
WHEELING, WEST VIRGINIA
Factories at WHEELING, W. VA. and WOODLAKE, CALIFORNIA

(305) King-Size Tank Cars for Fuel Oil

This coming August, Shippers' Car Line Division of ACF Industries will set a new record in its field. At that time, the construction of six 22,000-gal capacity tank cars will be completed.

These king-size tanks, the largest ever built, are to be mounted on 100-ton trucks for a company engaged in mining taconite, a low-grade iron ore. The cars will run along a short line railway for the transportation of fuel oil, which will be used in the taconite beneficiating process and for plant heating. the enormous tanks mean large-scale deliveries, requiring half as many trips.

Specifications for 22,000 gal tank cars

Underframe and Mounting	
Length Over Striking Plates	—55 in 9ft
Width Over Running Boards	—10ft 0 in
Center to Center of Trucks	—45ft 1½in
Height, Rail to Center Plate Bearing Surface	— 2ft 1¾in
Height, Rail to Center of Coupler	—2ft 10½in Max. — 2ft 10¼in Min.
Trucks	
Nominal Capacity	— 100 tons
Load Limit on Rails	— 251,000 lb
Gage	— 4ft 8½in
Wheel Base	— 5 ft 8in
Tank Class ICC 103-W	
Capacity	— 22,000 gal
Diameter Outside of Tank	— 104½in
Length Over Tank Heads	— 52ft 10⅝in

Shippers' Car Line Corporation.

Here's how you can get

Complete FREE Information—

New Equipment
Services
Advertised Products

Let us help keep you alerted to the newest in equipment and services in your fast changing industry

1. For more information on **Advertised Products** or **Services** in this issue, list on the card below the page number of the advertisement and name of the advertiser.

2. For more information on **New Equipment** and **Services** reviewed in this issue, circle the code number on the card below corresponding to the code number of the New Equipment or Service item.

3. Then print or type your name, title, company and complete mailing address . . . detach and drop in the mail.

List here the Advertiser of products or services on which you want more information.

Circle here the number of the New Equipment or Service item on which you want more information.

Postage Will Be Paid by Addressee

POSTAGE STAMPS REQUIRED IN COUNTRIES OTHER THAN U. S. A.

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD

FIRST CLASS PERMIT No. 1091, Sec. 34.9, P. L. & R., DALLAS, TEXAS

THE *Petroleum* **Engineer**

P. O. Box 1589

DALLAS, TEXAS

Use these Ready-Reply Cards for prompt action on your request

Here's how you can get

Complete FREE In
on the most si
and services .

Let us help keep you alerted to the newest in equipment and services in your fast changing industry

List here the Advertiser of products or services on which you want more information.

Circle here the number of the New Equipment or Service item on which you want more information.

Use these Ready-Reply Cards for prompt action on your request

Send me further details on PRODUCTS or SERVICES ADVERTISED on pages I have listed be

Page_____ By_____ Page_____ By_____

Page_____ By_____ Page_____ By_____

Page_____ By_____ Page_____ By_____

Page_____ By_____ Page_____ By_____

Circle each number corresponding to NEW EQUIPMENT or SERVICE items in

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137
141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157
161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177
181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217
221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237
241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257
261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277
281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297
301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317
321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337
341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357
361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377
381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397

Please print or type below. ☐ Please send me Index

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

July 15, 1956 Void after 90 days

E Information —

st significant current new tools

es . . . for field and plant use

1. For more information on **Advertised Products** or **Services** in this issue, list on the card below the page number of the advertisement and name of the advertiser.

2. For more information on **New Equipment** and **Services** reviewed in this issue, circle the code number on the card below corresponding to the code number of the New Equipment or Service item.

3. Then print or type your name, title, company and complete mailing address . . . detach and drop in the mail.

ve listed below.

_____

_____

_____

_____

Items in this issue.

5	16	17	18	19	20
5	36	37	38	39	40
5	56	57	58	59	60
5	76	77	78	79	80
5	96	97	98	99	100
5	116	117	118	119	120
5	136	137	138	139	140
5	156	157	158	159	160
5	176	177	178	179	180
5	196	197	198	199	200
5	216	217	218	219	220
5	236	237	238	239	240
5	256	257	258	259	260
5	276	277	278	279	280
5	296	297	298	299	300
5	316	317	318	319	320
5	336	337	338	339	340
5	356	357	358	359	360
5	376	377	378	379	380
5	396	397	398	399	400

d me index of 1955 content.

_____

_____

_____

Send me further details on PRODUCTS or SERVICES ADVERTISED on pages I have listed below.

Page_____ By_____ Page_____ By_____

Page_____ By_____ Page_____ By_____

Page_____ By_____ Page_____ By_____

Page_____ By_____ Page_____ By_____

Circle each number corresponding to NEW EQUIPMENT or SERVICE items in this issue.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220
221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240
241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260
261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280
281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320
321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340
341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360
361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380
381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400

Please print or type below.

☐ Please send me index of 1955 content.

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

For Complete FREE Information—

- **NEW EQUIPMENT**
- **SERVICES**
- **ADVERTISED PRODUCTS**

1. For more information on **Advertised Products** or **Services** in this issue, list on the card below the page number of the advertisement and name of the advertiser.

2. For more information on **New Equipment** and **Services** reviewed in this issue, circle the code number on the card below corresponding to the code number of the New Equipment or Service item.

3. Then print or type your name, title, company and complete mailing address . . . detach and drop in the mail.

These Ready-Reply Cards are designed to bring you fast action on your request for more information on the new equipment and service items listed on the following pages . . . or complete information on the products and services advertised in this issue

Postage Will Be Paid by Addressee

POSTAGE STAMPS REQUIRED IN COUNTRIES OTHER THAN U. S. A.

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD

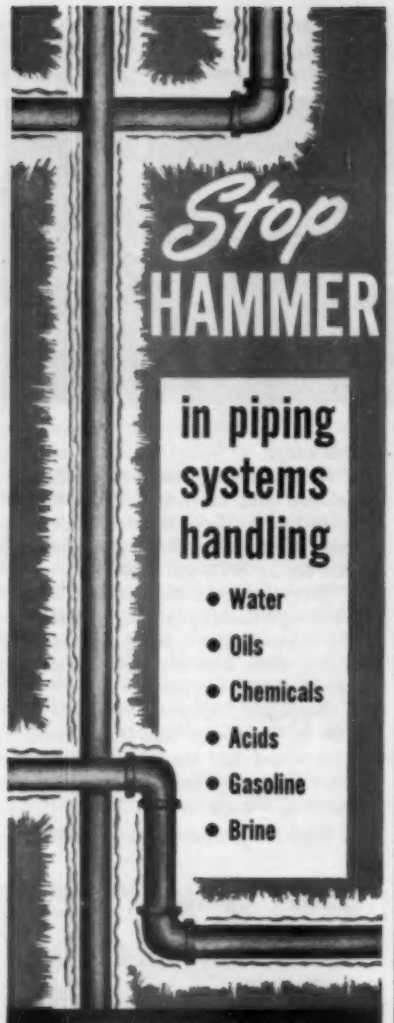
FIRST CLASS PERMIT No. 1091, Sec. 34.9, P. L. & R., DALLAS, TEXAS

THE *Petroleum* **Engineer**

P. O. Box 1589

DALLAS, TEXAS

See reverse for complete instructions



WILLIAMS-HAGER
FLANGED
Silent
CHECK VALVES

Providing dependable protection against damage from "surge pressures," these *Silent* Check Valves may be installed in horizontal, vertical and angular positions.

Write for Bulletins:

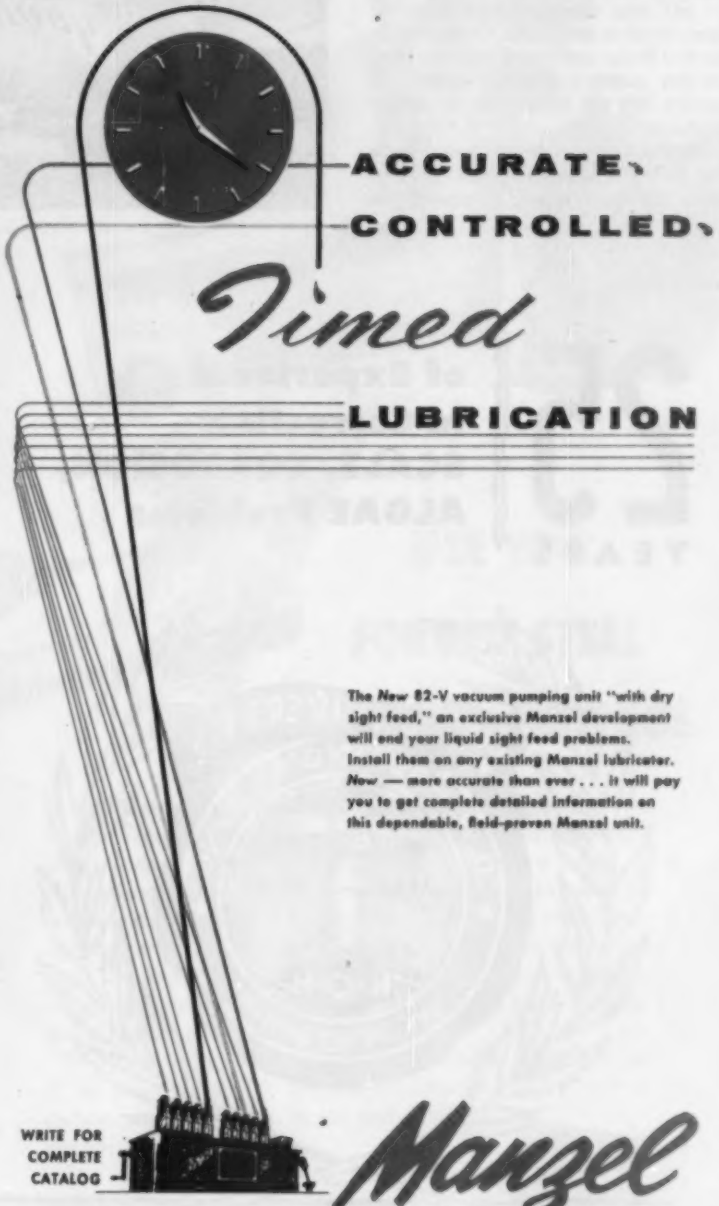
No. 654 on the Valves

No. 851 on Cause, Effect and Control of Water Hammer

THE WILLIAMS GAUGE CO., INC.

153 Stanwix Street
2 Gateway Center Pittsburgh 22, Pa.

Our 70th Anniversary • 1886-1956



ACCURATE,
CONTROLLED,
Timed
LUBRICATION

The *New* 82-V vacuum pumping unit "with dry sight feed," an exclusive Manzel development will end your liquid sight feed problems. Install them on any existing Manzel lubricator. *Now* — more accurate than ever . . . it will pay you to get complete detailed information on this dependable, field-proven Manzel unit.

WRITE FOR COMPLETE CATALOG

Manzel

LUBRICATORS • CHEMICAL FEEDERS • SLURRY PUMPS

291 BABCOCK STREET • BUFFALO 10, NEW YORK

A Division of Houdaille Industries, Inc.

(304) Advanced Design Features Boost Payload 200 Gal

Some three years ago, Butler completed the liquid transport industry's first truly successful modern aluminum semi-trailer tank. This one development enabled haulers to carry 8 to 11 per cent more payload than the most modern steel units. Compared to the first Butler aluminum units the present-day model is 1220 lb lighter and carries 200 gal more than its earlier prototype.

New cylindrical design is said to be the strongest shape that can be used for a transport vessel. It requires the least amount of metal per gallon of capacity, saves 200 lb over elliptical shapes, improves visibility and reduces

side surge.

Its valving system, especially developed and fabricated of aluminum saves 140 lb. Short, large-diameter passages speed unloading as much as 20 min for an 8000-gal load.

Short turn-over stubs save 75 lb over full-length flashing originally used. Wiring and air lines are now carried to rear inside stubs and connecting toe-rails, keeping walk-way clear.

Simplified fifth-wheel structure saves 100 lb of weight. Sub-frame between fifth wheel and landing legs has also been eliminated and sub-frame gussets omitted. Weight-saving: 75 lb.

Butler Manufacturing Company.

25 YEARS of Experience in Correcting SCALE, CORROSION, ALGAE Problems

D. W. HAERING & CO., INC.

ANALYSTS • CONSULTANTS • MANUFACTURERS

SAN ANTONIO, TEXAS

(302) Company Announces New Heavy-Duty Trucks

Chevrolet invades a heavier-duty commercial field with the announcement of 21 new hauling giants having up to nearly double the capacity of any truck previously produced by the company.

New vehicles are all in the 2½-ton class. Capacities range up to 32,000 lbs

maximum gross vehicle weight and 50,000 lb gross combination weight. The heavy-duty units will be built at the company's new truck assembly plant at Willow Run, Michigan. Significant features are: tandem axle equipment as production options; a sensational new automatic transmission that promises greater safety and con-

trol of heavily loaded vehicles.

Tested over the country's most rugged mountains, Powermatic six-speed automatic transmission provides new safety advantages for heavy trucks on steep downgrades because of an inbuilt hydraulic retarder. Also effective in heavy traffic, on curves and other highway situations, the retarder's effect is up to six times engine drag with little or no service braking needed on most downgrades.

Driver may also operate a selector to three speed ranges,—drive for normal work; intermediate for hilly country or heavy traffic; and low for traction or controlled power. Power take-off openings for installation of special equipment are provided on both sides of the unit for the first time in any automatic transmission.

New 2½-ton trucks have distinctive fender and grille design. Most notable is an air scoop, that supplies added air to the radiator. Heavy-duty frames are of a new, more rugged parallel-type construction while those on tandems are even sturdier. Heavier duty brakes and steering have been designed for the new units. A new Chevrolet option is the air-over-hydraulic brake for 2- and 2½-ton models.

Chevrolet Motor Division, General Motors Corp.

Cut "DOWN" TIME

"Down" time is costly and unproductive. Stitts run longer—cut down time for plug changes and mag checks. It's not the plug price, but the "change cost" that's important! Stitts cost a little more—save hundreds of dollars per engine per year. Factory equipment in Clark, Cooper-Bessemer, Worthington, other leading engines.

Write for Field Test Reports

Free $1 Gap Gauge

STITT Ignition Company
Columbus 1, Ohio

Get STITTS From:

BELL ENGINE SERVICE	JNO. MULLER CO.
BETHLEHEM SUPPLY CO.	REAGAN EQUIPMENT CO.
CLARK BROS. CO.	WAUKESHA ENGINE & EQPT. CO
COOPER-BESSEMER CORP.	WAUKESHA-PACIFIC
HOPEMAN EQUIPMENT CO.	WAUKESHA SALES & SERVICE Inc
INGERSOLL-RAND CO.	WORTHINGTON CORP.

MAGNETO IGNITION SERVICE R. ANGUS (ALBERTA) Ltd. CAN.
and Supply Stores Everywhere.

Here's the **EASY WAY TO WELD**
Small Diameter
Pressure Piping

USE W-S FORGED STEEL SOCKET-WELDING FITTINGS

In addition to providing high strength and toughness, W-S Forged Steel Socket-Welding Fittings are also easy to install. Deep sockets support and align the pipe for welding... eliminating the need for tack welding or special fixtures. No back-up ring is needed either. The fillet-weld is completely outside the pipe. Welding icicles just can't form inside the pipe. The result is a clean, tight welded joint that will readily resist high pressures and the stresses of shock and vibration. What's more, installation costs are lower.

W-S Socket-Welding Fittings are available in sizes ⅛" to 4" for schedule 40, 80, 160 and double-extra heavy pipe in carbon steel, stainless steels and alloy steels.

For complete information on the installation and operation advantages of W-S Forged Steel Socket-Welding Fittings, send today for Bulletin A-3-56.

W-S FITTINGS DIVISION
H. K. PORTER COMPANY, INC.
Roselle, New Jersey

Municipal Power Plant

Relies on Young Coolers

Young Horizontal Core Radiators cool jacket water serving the 3 power plant engines.

Fairbanks-Morse 960-HP O-P Dual-Fuel engines supply power and light to Brackenridge, Pa.

Young "HC"® Units
Cool Dual-Fuel Engines

Another example of Young-preference when it comes to *dependable performance required!* When Brackenridge, Pa., built its own power plant rather than buy from expensive and impractical outside sources, this community wisely specified dual-fuel engines cooled by Young radiators. Effective and efficient use of fuels, gas and oil, enables the power plant to operate with sizeable savings to Brackenridge.

Young HC Horizontal Core units are available for water, oil, gas cooling and steam and vapor condensing in any combination. HC features include, (1) low speed fan gives high efficiency performance at minimum horsepower requirements and low operating cost, (2) vertical air discharge provides even air distribution—eliminates air recirculation and effects of cross winds, (3) compact Young design permits space-saving, in-line installations of 2 or more units for additional capacities and services. Young HC units combine *efficiency, economy, versatility.*

Write for Free Catalog No. 550 Dept. 216-F

Put Young Talent to work for you . . .

Solving heat transfer problems is what we do best because it is our very reason for being. You, too, can harness the power of Young engineering talent. Write, wire or call without obligation.

HC is a registered trademark.

Young RADIATOR COMPANY
RACINE, WISCONSIN
Creative HEAT TRANSFER ENGINEERS FOR INDUSTRY
Heat Transfer Products for Automotive, Aviation and Industrial Applications. Heating, Cooling, Air Conditioning Products for Home and Industry.
Executive Office: Racine, Wisconsin. Plants at Racine, Wisconsin, Mattoon, Illinois

(298) Portable Track Pin Presses

For removal and installation of pins and bushings of crawler tracks, Lempco Products has announced the new Model 565 "Powermatic" Track Pin and Bushing Press.

Special tools and adapters are available with the press to service tracks from the smallest to largest models of Allis-Chalmers, Caterpillar, Euclid, International, and Oliver tractors.

Centralized controls enable the operator to do the complete job of pressing bushings and pins both out and in. Field tests indicate that the press can reduce pin and bushing replacement time as much as 50 per cent.

With automatic pressure-controlled ram head and recessed ram nose, this 150-ton hydraulic press has two ram speeds—180 in. per minute up to 30 tons pressure and 30 in. per minute over 30 tons. Convenient lever permits positive control of the ram at all times — starting, stopping, and retracting at any position. Buttress and jaws are adjustable and retractable to facilitate proper spacing of links and compensate for worn or bent tracks.

Overall dimensions of the Track Press are 36 in. wide, 125 in. long, and 63 in. high. Roller conveyor sections with stands are available for holding and moving the track in position for pressing.

For shop use, the stationary model is electrically powered — for field use a wheel-mounted model with trailer hitch is powered with gasoline engines, water cooled or air cooled.

Lempco Products, Inc.

(299) Seal-Fitting Prevents Leaks

A new seal-fitting that eliminates leaks at pipe thread connections without need of messy, sticky, seal compounds is announced by the Tru-Seal Division of Flick-Reedy.

Named "Tru-Seal" (pat. pending), the new seal-fitting is quickly, easily installed merely by (1) threading it on pipe or fitting, (2) threading pipe or fitting "hand tight" to desired position in port, (3) tightening Tru-Seal down against pipe or fitting with only light torque required. According to the manufacturer, Tru-Seal immediately stops leaks in old installations, insures leakproof operation at pipe thread connections of new installations, and offers the following important uses and advantages.

It is designed for use on any pipe thread, dry seal or standard; for all types of piping installation in all types of industry; for use on oil, water, air, gas, steam, vacuum, and chemical fluid lines (except lines carrying fluorine gas or molten alkaline metals); for operating temperatures of –280 F to plus 500 F; for pressures up to 3000 psi (15,000 psi minimum proof pressure). It is especially recommended for use in applications where leakproof operation is absolutely essential; where pipe compounds might impair circuit operation; where space limits the use of large or long pipe wrenches; and on fittings that require frequent take-down and re-assembly (such as test application).

Tru-Seal is said to remove the danger of stripped threads and cracked or distorted castings caused by the overtightening of conventional leaky joints and to save valuable time, money, and labor otherwise lost in correcting leaks in original piping installations. It can be additionally tightened without disturbing the piping.

Tru-Seal is claimed to eliminate the need of using special fittings and has been fully field tested and proven by leading equipment users and manufacturers. It is available in convenient sizes to fit the cast majority of piping instalaltions.

Flick-Reedy Corporation.

LADISH

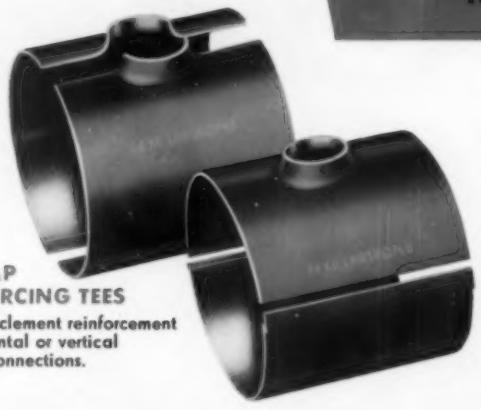
Developments

FOR THE PIPE LINE INDUSTRY

SPECIAL FITTINGS SOLVE INDUSTRY'S PIPING PROBLEMS

3-R EXTRA LONG RADIUS ELBOWS

Facilitate pipeline cleaning and improve flow efficiency.



HOT TAP REINFORCING TEES

Full encirclement reinforcement of horizontal or vertical branch connections.

Working closely with pipe line engineers, Ladish continues to pioneer fittings designed to simplify installation and improve transmission efficiency. Notable examples are illustrated on this page. To get more information on these developments . . . and the complete line of Ladish Controlled Quality pipe fittings, use the coupon below.

ANCHOR FLANGES

When imbedded in concrete restrict line movement.

HIGH YIELD FITTINGS

In sizes through 42"
36,000-52,000 yield.

MULTIPLE OUTLET FITTINGS

Reduce cost and simplify installation of gate settings.

TO MARK PROGRESS

LADISH GENERAL CATALOG No. 55

This 304-page reference manual presents complete data on the Ladish line of Controlled Quality Fittings . . . includes 56 pages of piping engineering data.

BULLETIN 55-1

21-page bulletin presents descriptive data on Ladish pipe line fittings developments.

BULLETIN 55-2

82-page volume tabulates and graphically charts design pressures for steel pipe for gas transmission and distribution systems in accordance with recently revised Section 8 of ASA. B-31.1.8.

LADISH CO. Cudahy, Wisconsin (Milwaukee Suburb)

Please send:

- ☐ LADISH GENERAL CATALOG No. 55
- ☐ BULLETIN 55-1
- ☐ BULLETIN 55-2

NAME _____ TITLE _____

COMPANY _____

STREET _____

CITY _____ ZONE ____ STATE _____

NEW Most Powerful One Man Chain Saw You Can Own

7 horsepower
29 pounds

HOMELITE

A DIVISION OF TEXTRON, INCORPORATED
4707 RIVERDALE AVENUE, PORT CHESTER, NEW YORK
MANUFACTURERS OF CARRYABLE PUMPS • GENERATORS • BLOWERS • CHAIN SAWS
In Canada: Terry Machinery Co., Ltd.
Toronto • Montreal • Vancouver • Ottawa • Edmonton • Moncton

7-29

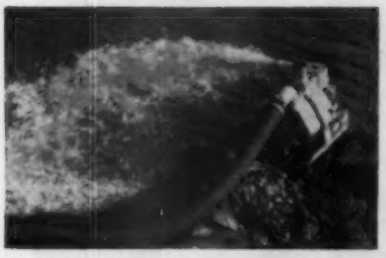
Complete Line of Chain Saws for Every Cutting Job

MODEL 17 — An all purpose saw that brings down trees up to 4 feet in diameter. Available with special brush cutting and clearing attachments for complete versatility 3.5 horsepower 22 lbs.

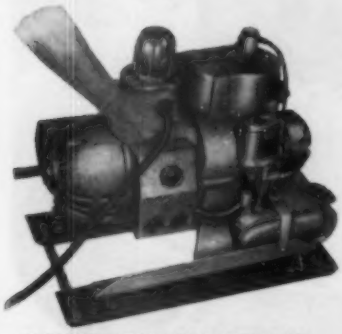
MODEL 5-20 — All the versatility of the 17 with added power, lighter weight. 5 full horsepower — 20 lbs. Brings down trees up to 6 feet in diameter.

MODEL EZ — Lightest, most powerful direct drive chain saw ever developed. Only 19 pounds, full 5 horsepower. Brings down trees up to 3 feet in diameter.

CHOOSE
from a full line of
HOMELITE
Carryable
Construction
Equipment



SELF-PRIMING CENTRIFUGAL AND DIAPHRAGM PUMPS
Sizes: 1½" to 3" — capacities to 15,000 g.p.h. for dewatering and water supply.



ELECTRIC GENERATOR SETS FOR TOOLS AND LIGHTS
Complete range of sizes and voltages up to 5,000 watts.

LIGHTWEIGHT POWERFUL ONE-MAN CHAIN SAWS;
Complete line of saws with clearing and brushcutter attachments for every woodcutting job.

HOMELITE
A DIVISION OF TEXTRON, INCORPORATED
PORT CHESTER, N. Y.

(273) Pocket Hardness Tester

Pacific Transducer offers a new low-cost, portable, pocket hardness tester for determining the hardness of steel alloys and other metals in the range of from 25 to 65 Rockwell "C" scale.

The test set features portabilty. It can be carried in the pocket on the job and may be used to test specimens of steel alloy in almost any place or position. It is a direct-reading device—no further calculations are required. This makes the unit particularly fast in operation.

Included in the test set are a microball indentor, a measuring microscope, and a standard hardness test block. It operates by means of an impact indentor that drives a 1/16-in. tungsten carbide ball a short distance into the sample to be tested. Diameter of the indentation is then measured by the reticulated microscope. As the diameter is a function of the hardness, the reticule indicates the hardness directly. It is accurate ±1½ points "C" scale.

Pacific Transducer Corporation.

(274) Industrial Weed Control Product Applied Dry

An industrial weed control chemical called Nalco H-174 is being offered to general industry for the first time this spring after several years of successful use by a number of large railroads.

This dry granular material is manufactured by National Aluminate and marketed through chemical distributors.

The product is claimed to kill all vegetation and is recommended for use wherever weeds, brush, or grasses create a fire or safety hazard or give plant property an unsightly, unkempt appearance.

Shipped and used dry, Nalco H-174 is applied at a dosage of 300-400 lb per acre, which is said to be considerably less than that required of most weed killers. Because of the smaller volume needed, storage and handling problems are minimized and ordinary fertilizer spreaders or seed sowers are used for application. The dry, granular form is reported as being virtually dustless, greatly reducing the possibility of chemical drift that endangers desirable vegetation near areas being treated.

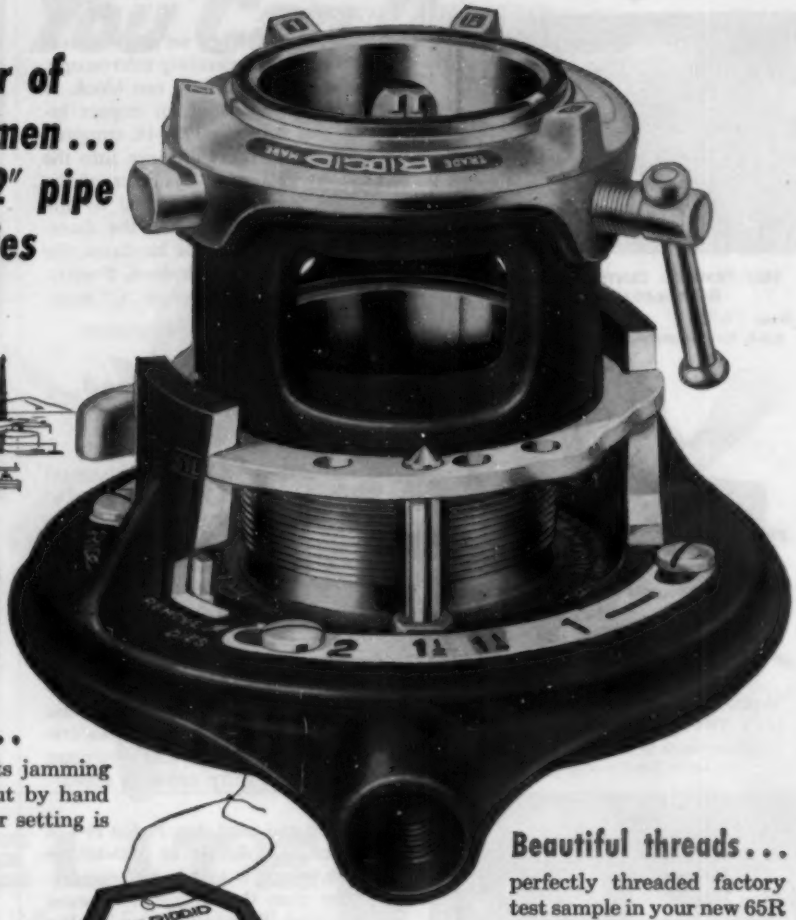
Nalco H-174 may be applied at any time during the year since it stays in the ground until absorbed by the roots of the weeds. Application early in the growing season, or before growth starts, is particularly desirable as it kills plants without leaving any dead weed debris.

National Aluminate Corporation

Nearest Thing to Machine Pipe Threading

RIDGID Jam-proof 65R

Favorite threader of gas and petroleum men... that threads 1" to 2" pipe with 1 set of dies



Ready for work fast...
you set 65R to pipe or conduit size in 10 seconds . . . self-contained 1", 1¼", 1½", 2" dies. Self-centering workholder sets to size instantly.

No mistakes...
automatic kick-out prevents jamming when standard thread is cut by hand or power drive. Workholder setting is mistake-proof.

RIDGID Bench Yoke Vise

RIDGID Spiral Reamer

RIDGID Pipe Wrench

RIDGID Pipe Cutter

RIDGID Drop-Head Pipe Threaders

Every RIDGID Pipe Tool **TESTED** individually before shipment

Beautiful threads...
perfectly threaded factory test sample in your new 65R proves it!

You can't beat RIDGID 65R for speed, easy work and long service.

Buy it at your Supply House!

RIDGID
Work-Saver Pipe Tools

The Ridge Tool Company, Elyria, Ohio, U.S.A.

Youngstown

OFFERS THE "BIG 5" IN ELECTRIC WELD LINE PIPE FOR OIL AND GAS PRODUCING AREAS. . .PROVEN AND READY FOR EFFICIENT SERVICE IN THE FIELD

Here are the "Big 5" reasons why Youngstown Electric Weld Line Pipe is your best buy:

1. It bends readily
2. Wall thickness is uniform
3. Line up characteristics are excellent
4. Weldability is outstanding
5. Long lengths save you time and trouble

Terrain dictates some mighty peculiar contours. As an oil or a gas man, you're well aware of this. But, are you also aware of the secret of bendability of line pipe? It's simply the right combination of physical and chemical properties. Youngstown Electric Weld line pipe manufactured from uniform high quality steel, is capable of producing even smooth bends to fit any contour with uniform roundness. You know the importance of this—you know what this means on any job.

Youngstown maintains sales and service offices throughout the oil and gas producing country—see your area representative soon.

Youngstown

ELECTRIC WELD LINE PIPE

QUALITY YOUNGSTOWN SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY *Manufacturers of Carbon, Alloy and Yoloy Steel*

General Offices: - - - Youngstown 1, Ohio.

the Chemical Division of General Mills announces the appointment of...

Dearborn CHEMICAL COMPANY

as sales agents to the petroleum industry for the expanded line of General Mills fatty nitrogen products. These products are used as corrosion inhibitors and bactericides in crude oil production, transportation and refining.

Dearborn Chemical Company has been a pioneer organization in the field of water conditioning and corrosion control over the past 70 years. The company has long been a supplier to the petroleum industry.

With the General Mills line of fatty nitrogen products, they will be enabled to provide broader service to the industry.
Their competent technical service personnel are at your service.*

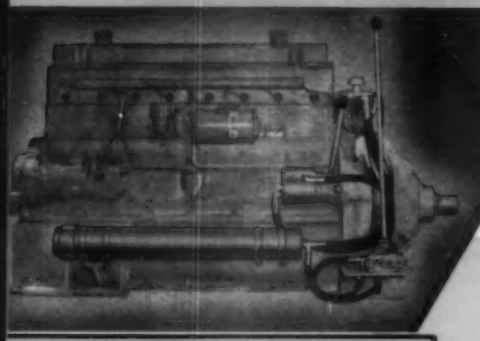
CHEMICAL DIVISION of
General Mills KANKAKEE, ILLINOIS

**For more information on how these products and services can benefit you, write for the booklet "Fatty Nitrogen Primer," Dearborn Chemical Company, Merchandise Mart Plaza, Chicago 54, Illinois.*

IF YOUR ENGINE WILL RUN.....

HYDROTOR®

WILL START IT!



Hydrotor patented under U.S. patent numbers
2608966
2653577
2711724
2710606

FITS ALL ENGINES

FACTORY APPROVED

SOLD THE WORLD OVER

SEVEN SUCCESSFUL YEARS

ASTONISHING PERFORMANCE

RETAINS POWER INDEFINITELY

DIESEL • GAS • GASOLINE ENGINES

THE TRIUMPH OF ENGINE STARTING

TRIPLE SPEED • LIFE • POWER • RELIABILITY

NEVER WITHOUT POWER • NO DEAD BATTERIES

the original hydraulic starter that revolutionized engine starting

It took 10 years to develop the non Electric Explosion Proof, Hydrotor Starting System. Millions went into its development.

Years of gruelling field service proved its reliability.

It breezed thru a test of 72,000 starts and showed no wear.

Approved and endorsed by Builders of Engines, Tractors, Trucks, Power Units, Cranes, Shovels, Boats, Locomotives, Road Machinery, Oil Industry Equipment, etc.

The Hydrotor is the original & genuine Hydraulic Starter covered by U. S. patents.

U. S. COAST GUARD APPROVED FOR ALL AUXILIARY ENGINES ABOARD SHIP.

higher cranking speeds arctic to tropics

HYDRAMOTIVE, Inc.

6723 DENISON AVE. CLEVELAND 2, OHIO

Pumping Progress Report

FOR PETROLEUM ENGINEERS

An advertisement prepared by the Aldrich Pump Co., Member of Hydraulic Institute, U.S.A.

PUMP INSPECTION, MAINTENANCE AND REPAIR are jobs too frequently ignored in the design of production pumps. This has been verified by a survey of more than 15,000 pump installations. Speed and economy of maintenance was frequently quoted as a major factor in pump selection.

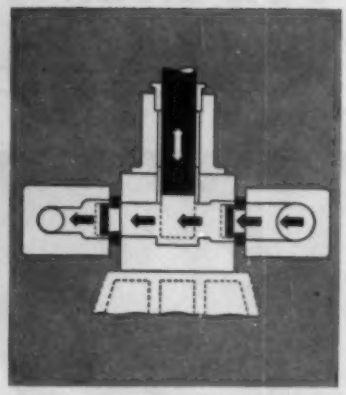
SECTIONALIZED FLUID-ENDS offer one of the best ways to guarantee both speed and economy in pump maintenance. As originated by ALDRICH Pump Co. Engineers, the Sectionalized Fluid-End comprises four main assemblies — the working barrel, suction manifold, discharge manifold and stuffing box.

SPEED IN MAINTENANCE is assured because of ease of accessibility of all wearing parts. Manifolds can be slid back on studs and valves removed as complete units. Split collar and flange connection of plunger to yoke permits easy removal of plunger.

ECONOMY OF MAINTENANCE results from speed in maintenance. Perhaps even more important is the simple fact that it is cheaper to replace a single section than a complete fluid-end. Another important economy is parts interchangeability. Among 3-, 5-, 7- and 9-plunger units of any series, wearing parts are interchangeable. Where a combination of multiplex pumps is required, this reduces spare parts stocks.

THE ALDRICH PUMP COMPANY is the originator of the DIRECT FLOW principle — a design innovation that utilizes the sectionalized fluid-end principle. Aldrich Engineers have become known as the people to take your tough pumping problems to. We have never turned down a challenge.

FURTHER INFORMATION can be had direct from the company. Tell us your problem and we'll send you Data Sheets describing the size pump we recommend to solve your problem. Address your request to: The Aldrich Pump Company, 26 Pine Street, Allentown, Pa.



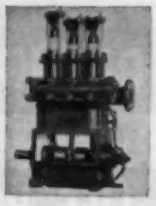
Aldrich Direct Flow Fluid-End Design

...for your tough pumping problems specify ALDRICH

The Direct Flow principle, an Aldrich design innovation, is a major forward step toward the solution of tough pumping problems of all kinds. Not only does it eliminate two right-angle turns in the fluid-end, but in addition makes possible complete Fluid-End Sectionalization. This is another Aldrich design innovation which permits economies of maintenance and repair offered by no other type pump.

CHECK THESE ADVANTAGES OF SECTIONALIZED FLUID-ENDS:

Less expensive parts replacement
Ease of inspection and maintenance
Interchangeable wearing parts
No special equipment for valve removal
Easily accessible stuffing boxes



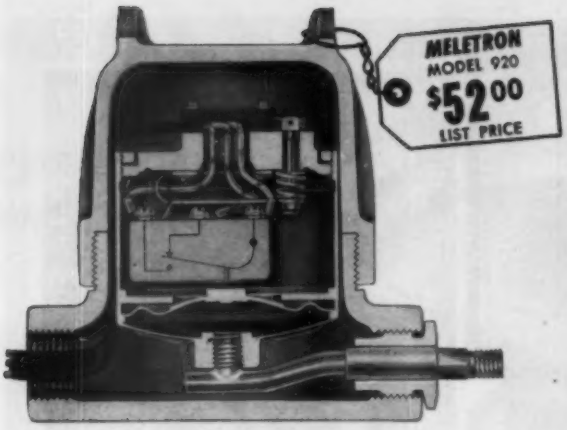
Write today for Data Sheets describing the Direct Flow Pump Series.

THE ALDRICH PUMP COMPANY

Originators of the Direct Flow Pump

26 PINE STREET
ALLENTOWN, PA.

Representatives in principal cities



Here's the Simplest Diaphragm Pressure Switch for Explosive Atmospheres

WE BUILD IN	WE DON'T USE
EXTREME ACCURACY and DEPENDABILITY maintained during operating life due to direct acting design	**LINKAGES & BEARINGS** which, as they wear, make the setting of the pressure switch drift.
OPERATION IN ANY POSITION which saves the installation costs encountered in mounting a switch that uses liquid switching elements.	**LIQUID SWITCHING ELEMENTS** which make the switch difficult to mount and very critical to vibration.
IMMUNITY TO VIBRATION you can mount the switch directly on your vibrating or moving equipment.	**ACCORDION DIAPHRAGMS** which make the pressure switch sensitive to vibration.

To get complete specifications and operating data ask for bulletins 920-925.

BARKSDALE VALVES

PRESSURE SWITCH DIVISION

5125 Alcoa Avenue, Los Angeles 58, California

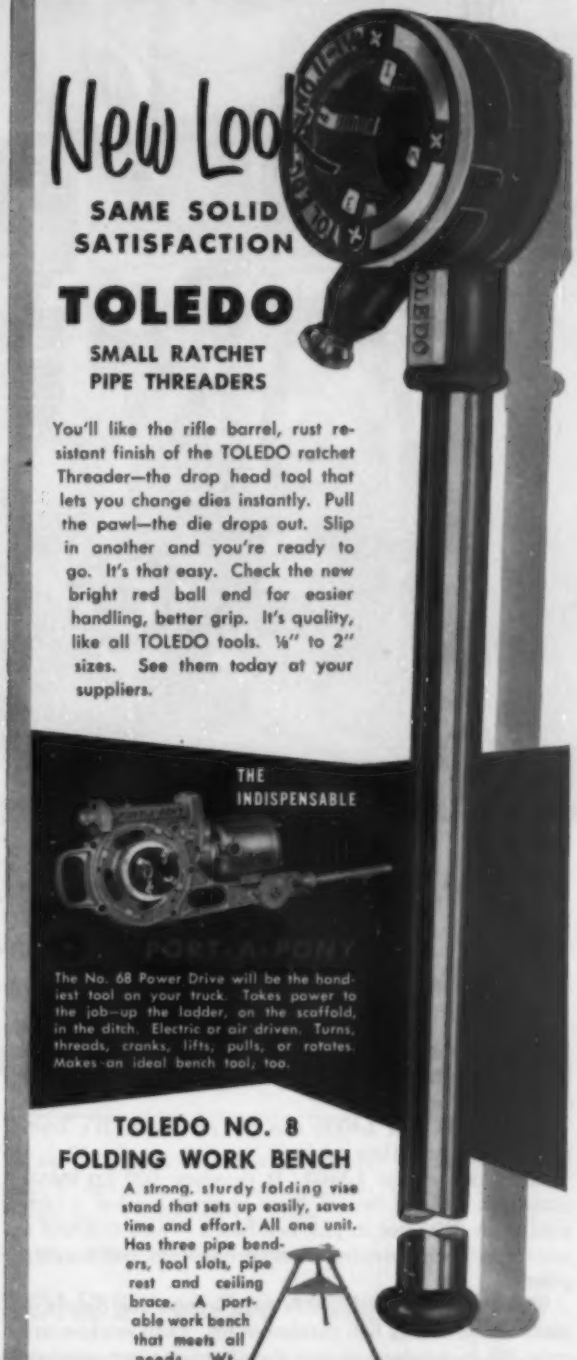
New Look

SAME SOLID SATISFACTION

TOLEDO

SMALL RATCHET PIPE THREADERS

You'll like the rifle barrel, rust resistant finish of the TOLEDO ratchet Threader—the drop head tool that lets you change dies instantly. Pull the pawl—the die drops out. Slip in another and you're ready to go. It's that easy. Check the new bright red ball end for easier handling, better grip. It's quality, like all TOLEDO tools. ⅛" to 2" sizes. See them today at your suppliers.



THE INDISPENSABLE

PORT-A-PONY

The No. 68 Power Drive will be the handiest tool on your truck. Takes power to the job—up the ladder, on the scaffold, in the ditch. Electric or air driven. Turns, threads, cranks, lifts, pulls, or rotates. Makes an ideal bench tool, too.

TOLEDO NO. 8 FOLDING WORK BENCH

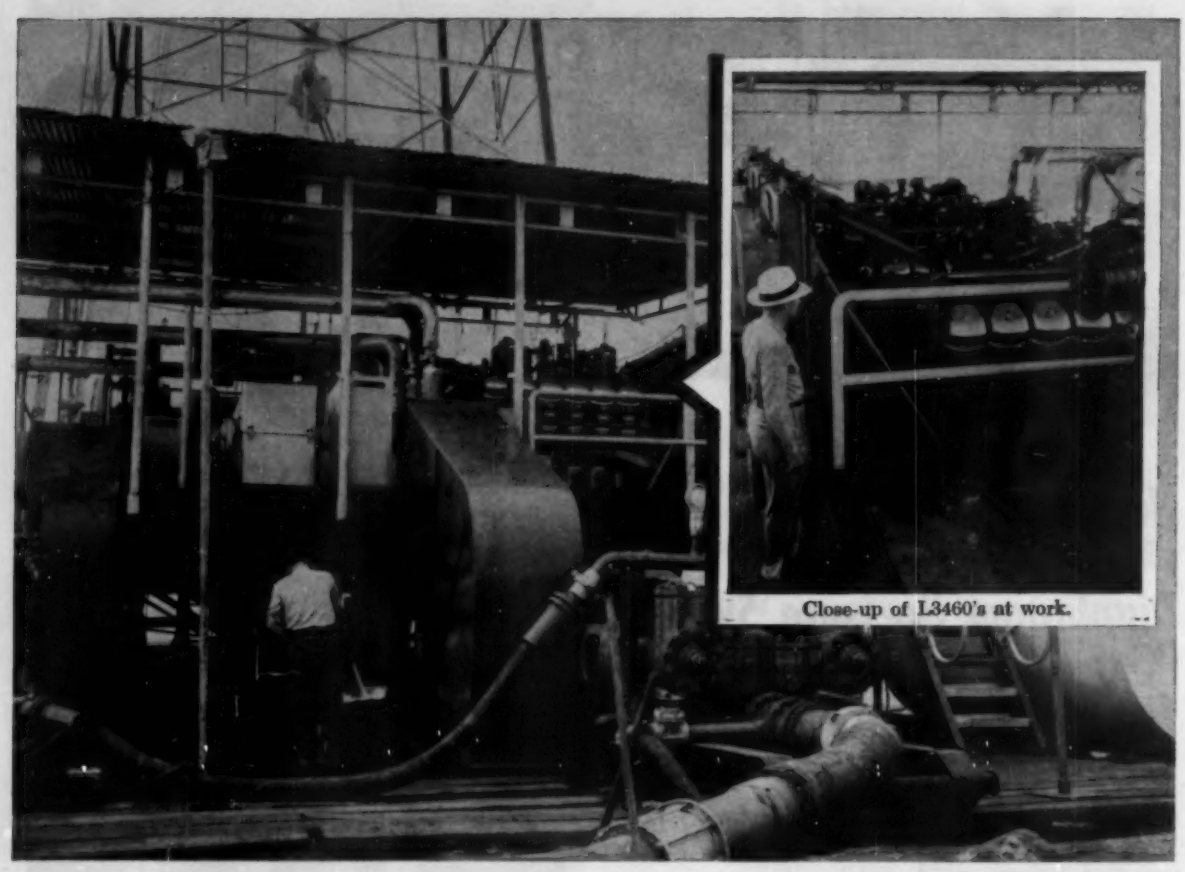
A strong, sturdy folding vise stand that sets up easily, saves time and effort. All one unit. Has three pipe benders, tool slots, pipe rest and ceiling brace. A portable work bench that meets all needs. Wt. 33 lbs.

THE TOLEDO PIPE THREADING MACHINE COMPANY
TOLEDO 4, OHIO

BUILDERS OF THE WORLD'S FINEST PIPE TOOLS

TOLEDO

PIPE THREADERS • PIPE WRENCHES • PIPE MACHINES



Close-up of L3460's at work.

Here's the Way to Power a Rig... for Deep Holes!

... use LeRoi L3460 or L4000 V-12 drilling engines to get the outstanding acceleration and lugging power you need for faster round trips

If you have an engine that can stand the gaff on deep holes — you have an engine that can help you bottom any hole at lower cost.

The L3460 and L4000 can do just that. It's been proven time and time again.

Let's look at the L3460. It develops 600 hp maximum. On one rig two of these engines hoisted 5-inch pipe from 8300 feet in just two hours — and this was a wet trip. That's proof of both acceleration and lugging power.

The L4000 is the L3460's twin except for displacement. It produces 655 maximum hp. Both engines are only 164 inches long so that they have the compactness that helps you keep to overall width and weight limitations. And they're built to stand oil-field handling.

Not only do you get more horsepower per dollar from these V-12's, but you also get these important features: Short-stroke design that gives you greater horsepower and speed, without compromising engine life. Wide speed range up to 1350 rpm. Operation on oilfield fuels —natural gas or butane. Conservative rating. Lightweight pistons, hydraulic tappets, short-radius rotating parts, and sensitive controls to provide hair-trigger response to load demands.

Yes, you can drill them deep and drill them fast with L3460's or L4000's. Let your supply house or Le Roi distributor show you why. If you want descriptive literature, just write us for it.

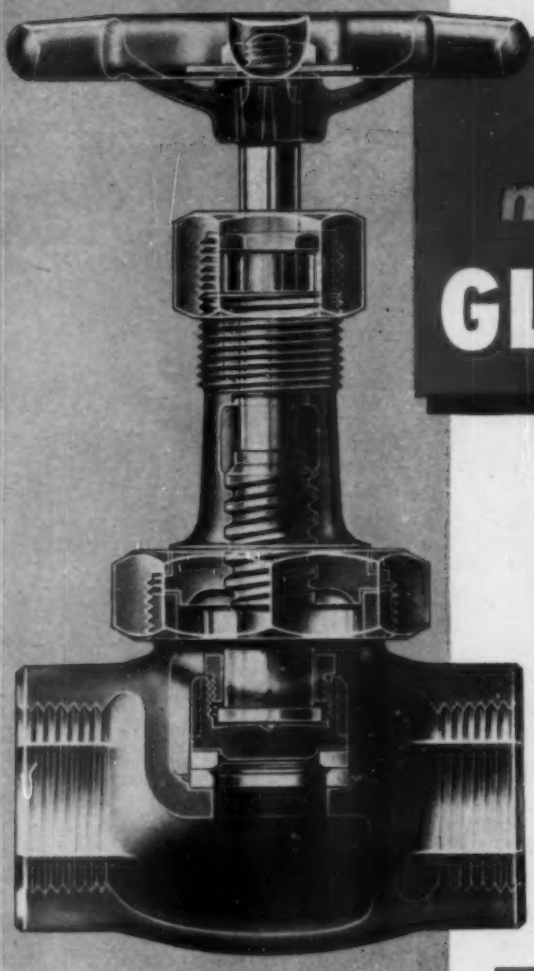
P-136

LE ROI *Division of Westinghouse Air Brake Co.*

Milwaukee 1, Wisconsin

PORTABLE AIR COMPRESSORS TRACTAIR STATIONARY AIR COMPRESSORS AIR TOOLS ENGINES

LQ600



. . . World's most versatile GLOBE VALVE

Wherever bronze globe valves are used, there's an LQ600 that's best for the job . . . any size from ¼ to 2 inches, any pressure up to 200 lbs. steam or 400 lbs. water, oil, gas, and air.

LQ600 is best for the job, because its performance has not been matched by any other valve.

The Brinalloy* seats and discs are fused in to stay and have never been known to leak or fail in over 5 years of tests and in more than 100,000 installations.

Brinalloy* seats and discs resist wear and corrosion far better than 500 Brinell Stainless Steel and outwear even case hardened Stainless Steel exceeding 1000 Brinell.

You'll be money ahead for years to come when you standardize on *the world's most versatile bronze globe valve*. Keep LQ600-150 and LQ600-200 in stock to replace your conventional bronze valves as they fail. Now's the time to stop those expensive leaks . . . in both your piping and profits.

*Patented alloy T. M. Reg.

FIG. LQ 600-150
150 lb. S.P. 300 lb. W.O.G.

FIG. LQ 600-200
200 lb. S.P. 400 lb. W.O.G.
¼ to 2 Inches

See your Lunkenheimer Distributor for literature, or write The Lunkenheimer Company, Box 360, Cincinnati 14, Ohio.

BRONZE • IRON • STEEL • PVC

LUNKENHEIMER®

THE ONE *Great* NAME IN VALVES

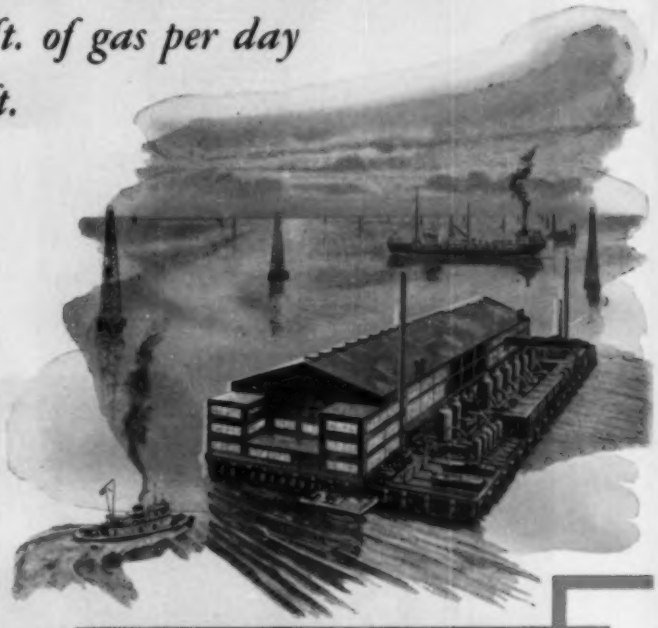
L-656-10

10 Ingersoll-Rand turbo-compressors now serving

Creole's outstanding offshore repressuring plant

Increase oil recovery from Lake Maracaibo reservoir*

Arranged in 7 stages of compression, ten I-R Compressors are delivering 137,000,000 cu. ft. of gas per day at 2,000 psi to oil pools 4,500 ft. underneath the lake



CREOLE PETROLEUM CORPORATION's huge $20 million gas-compression plant is the largest gas conservation project so far completed in Venezuela. Located on a pile-supported platform in Lake Maracaibo, it represents a bold concept in pressure maintenance for pushing petroleum up from a reservoir 4500 feet underneath the lake.

One of the plant's innovations is the use of 10 I-R multi-stage centrifugal compressors, specially designed for this outstanding project. Arranged in 7 stages of compression, the compressors are driven by 60,000 hp of combustion-gas-turbines. Handling gas from the lake's well heads, they compress it from 10 to nearly 2000 psi—the highest operating pressure ever attained with centrifugal compressors—and then force the gas back into the ground.

For information on these or any other Ingersoll-Rand air and gas compressors or blowers, contact your nearest I-R engineer.

*ATTESTING the efficiency, economy and dependability of I-R equipment in such continuous, heavy-duty service, 12 more I-R compressors have been ordered for still another and larger repressuring plant on Maracaibo which Creole is now constructing.

Ingersoll-Rand

12-392

11 Broadway, New York 4, N. Y.

10 gas-turbine-driven Ingersoll-Rand centrifugal compressors, passing gas through 7 stages of compression from 10 to 2000 psi.

Simplified flow diagram of Creole's huge pressure maintenance plant.

- CLASSIFIED -

GAS ENGINEERS
(Ages 25-38)

A major integrated U. S. oil company operating in South America has challenging career opportunities in an expanding organization for qualified natural gas engineers. Requirements include a degree in chemical, gas or petroleum engineering and 5 to 10 years of experience in gas and gasoline and compressor plants, and gas transmission systems, engineering and economic evaluations of natural gas projects. Salary and bonus approximately $13,000-$18,000, depending on qualifications and experience. Liberal employee benefits and home vacations with travel expenses. Send complete personal data and experience resumé. Interviews will be arranged for qualified candidates. *All replies confidential.* Box 1221, Dept. F-80, New York, N. Y.

PETROLEUM ENGINEERS
(Ages 25-38)

Career opportunities for petroleum engineers with a major U. S. integrated oil company operating in South America. Position vacancies exist for reservoir and petroleum production engineers at levels requiring from five to eight years of pertinent experience. Candidates must have a degree in petroleum, mechanical or chemical engineering. Excellent growth opportunities in an expanding organization. Salary, including bonus, $12,600-$17,000, depending on qualifications and experience. Liberal employee benefits and home vacations with travel expenses. Send complete resumé of education, personal data and work experience. Interviews will be arranged for qualified candidates. *All replies confidential.* Box 480, Dept. YY-80, New York 19, N. Y.

APPLICATION ENGINEER

Graduate E.E. with a minimum of five years' experience in oil field and refinery control and instrumentation systems and the contacting of major oil and petro-chemical companies.

Position offers excellent opportunities with a new and growing division of a long established Mid-West Company. Many fringe benefits, pensions, group insurance, etc. Top salary if qualified. Considerable travel necessary.

All applications held in strictest confidence.

Forward resumé covering qualifications and salary required to: Box 177, c/o *The Petroleum Engineer,* Box 1589, Dallas,, Texas.

DRILLING ENGINEER

Major drilling company has opening in its general offices for young graduate petroleum engineer to work with manager of operations. Age limit 35. Must have field experience in Mid-Continent areas and be familiar with drilling techniques and machinery. In replying give past employment record, experience, and education. *All replies confidential.* Reply Box 178, The Petroleum Engineer, Box 1589 Dallas, Texas.

PETROLEUM ENGINEERS

Experienced graduate engineers for immediate openings in Saudi Arabia and New York City. For engineering work in development, production, drilling, process, and oil and gas engineering on primary and secondary recovery problems.

RESERVOIR FLUID ANALYST

With degree in Physical Chemistry or Chemical Engineering plus 5 years' petroleum production engineering which should include 2 years' study of reservoir fluid behavior.

Salaries commensurate with training and experience. Write outlining personal history and work experience. Please include telephone number.

Recruiting Supervisor, Box 117

ARABIAN-AMERICAN OIL COMPANY
505 PARK AVENUE
NEW YORK 22, NEW YORK

PETROLEUM ENGINEERS
(South America)

Graduate engineers with experience in drilling, production, reservoir and equipment. Working knowledge of Spanish desirable but not essential.

LUBRICATION ENGINEERS
(West Africa)

Mechanical Engineer's degree and experience in lubrication and petroleum products. Fluent French not essential but working knowledge desirable.

OPERATIONS SUPERVISOR
(West Africa)

Experienced all phases construction engineering concerning marketing petroleum products, i.e., appropriations, terminal layout and maintenance. M.E. or C.E. degree desirable but not essential. Working knowledge French essential.

Liberal Employe Benefit Plans
Salary commensurate with experience

Forward resume of education and experience to

THE TEXAS COMPANY
Foreign Personnel Office
135 East 42nd Street
New York 17, N. Y.

PROCESS ENGINEER

"Experienced Engineers for process design with well established manufacturer, Mid-continent area. Challenging work with excellent opportunity for advancement. Salary commensurate with experience. Relocate. All replies will be kept in strictest confidence." **Box 175, The Petroleum Engineer, Box 1589, Dallas, Texas.**

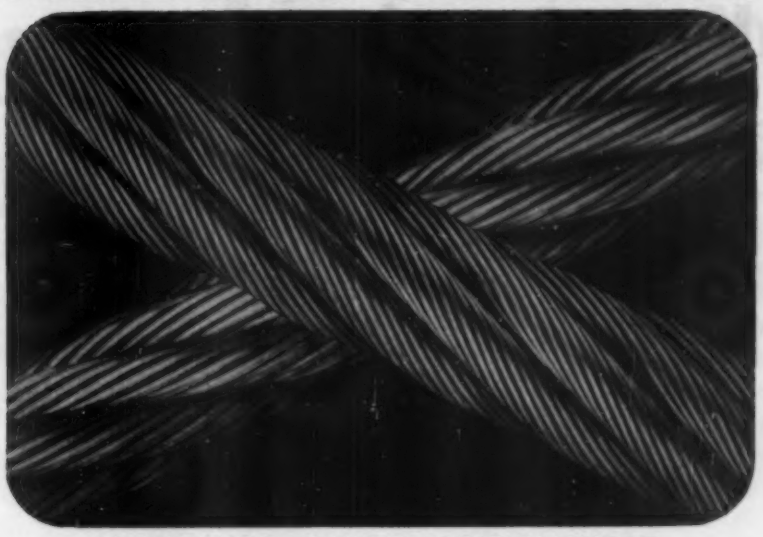
A Leading Los Angeles Bank

Has an opportunity for an attorney experienced in legal work for the petroleum industry.

In replying please send resume of experience and qualifications.

Write **Box 176, c/o Petroleum Engineer, Box 1589, Dallas, Texas.**

FIRST WE DEVELOPED 1105 ROPE WIRE.



THEN WE MADE ROEBLING'S

Royal Blue

WIRE 1105 ROPE

1105 takes Royal Blue out of the ordinary wire rope class.

1105 is a rope wire that's new—that's stronger. It's the biggest news in many years.

1105 is the result of more than a century of research and development—it's the wire that gives Roebling Royal Blue the stamina that pays off in service.

Contact your Roebling distributor or write us for the full story.

ROEBLING

Subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 2340 GLENDALE-MILFORD RD., EVENDALE • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • PITTSBURGH, 1733 HENRY W. OLIVER BLDG. • SAN FRANCISCO, 1740 17TH ST. SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, 19 RECTOR ST., NEW YORK 6, N.Y.

Let's Talk About

Sealing Service

DURAMETALLIC is ready to help you with those stuffing box problems . . . we've been doing it for industry for 38 years. Experienced factory-trained sales and service engineers are located in all sections of the U.S.A.

Without charge, a staff of research and development engineers at our Kalamazoo plant are ready to help you with your sealing needs.

When seeking an answer to satisfactory sealing . . . put it up to Durametallic.

Write Today for Bulletin File No. DM-PE

DURAMETALLIC CORPORATION

KALAMAZOO, MICHIGAN

FOR QUALITY IT'S **KELLOGG**

Manufacturers of Wire Transmission Equipment and Component Parts

Since 1897

Wire Transmission Equipment

- Z-11 Series Negative Impedance Repeater
- Hybrid Type Repeater
- Termination Equipment for Microwave Stations

Components

- Telephone Type Relays
- Ten Count Mono Relays
- Telephones
- Toroid Coils
- Lever Switches

KELLOGG Division of IT&T

KELLOGG SWITCHBOARD AND SUPPLY COMPANY

A Division of International Telephone & Telegraph Corp.
Sales Offices: 79 West Monroe Street, Chicago 3, Illinois

Dept. 80-G

Check **these features**

Philadelphia

spiral-bevel COOLING TOWER DRIVE

- √ Maximum Efficiency . . . 97%-98% with minimum heat loss.
- √ Precision generated Spiral-Bevel Gears, case hardened for long service life.
- √ Heavy duty Housing construction.
- √ High dome permits mounting fan directly on unit, with ample clearance below fan blades.
- √ Oversize bearings insure trouble-free operation.
- √ Rugged . . . dependable . . . economical Reducer meets all AGMA standards.

These widely used Drives are made in six sizes, rated from 15 hp to 75 hp at 1750 rpm motor speed, with Ratios ranging from 2:1 to 9.2:1.

Catalog CT-53 available on request.

phillie gear

PHILADELPHIA GEAR WORKS, INC.

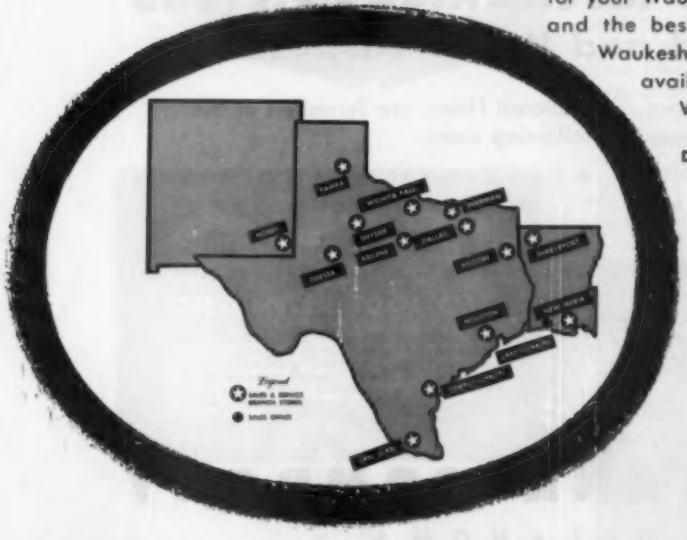
ERIE AVE. & G STREET PHILADELPHIA 34, PENNA.
Offices in all Principal Cities

INDUSTRIAL GEARS & SPEED REDUCERS
LIMITORQUE VALVE CONTROLS
FLUID AGITATORS • FLEXIBLE COUPLINGS

Virginia Gear & Machine Corp. • Lynchburg, Va.

When you buy a Waukesha engine you buy the finest power equipment money can buy. When you need parts for your Waukesha engine you naturally want the best—and the best parts, the parts made specifically for Waukesha engines, are **genuine** Waukesha parts, available throughout the oil country through Waukesha Sales and Service, Inc. stores.

Don't take a chance. Buy genuine Waukesha parts from the Waukesha Sales and Service, Inc. store near you.



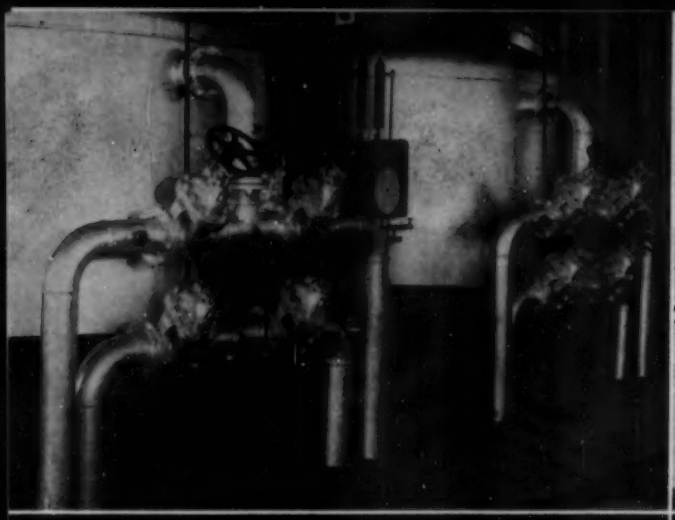
WAUKESHA

Sales & Service, Inc.

1422 MAURY ST. • HOUSTON, TEXAS

EXCLUSIVE DISTRIBUTORS FOR WAUKESHA PRODUCTS IN TEXAS, NORTH AND WESTERN LOUISIANA, SOUTHERN ARKANSAS AND NEW MEXICO

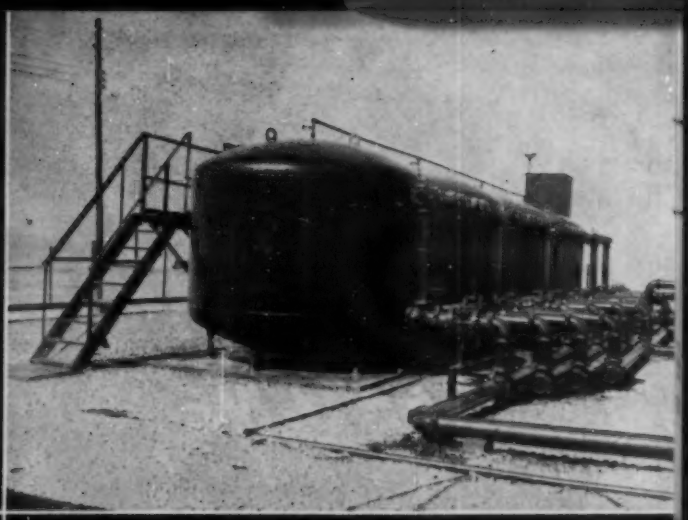
WORLD'S LARGEST DISTRIBUTOR OF OIL FIELD ENGINES



2-8′ x 5′ 40 PSI W.P. National Filters in Illinois Water Flood

•

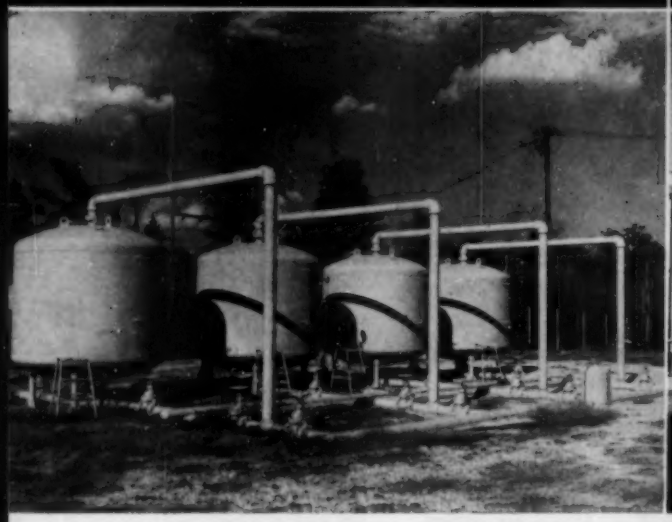
4-8′ x 5′ 60 PSI W.P. National Filters in gasoline plant near Schuler, Arkansas

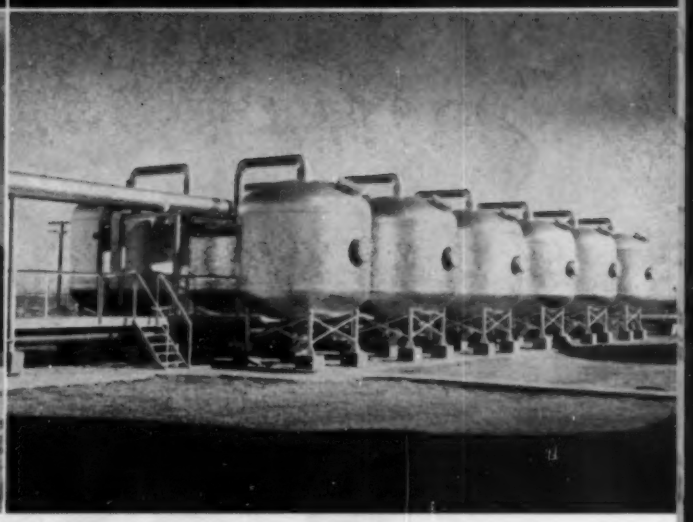


8-75 PSI W.P. National Filters in Eastern Oklahoma Water Flood

•

Battery of 200 PSI W.P. National Filters in West Texas Water Flood





National RAPID MECHANICAL FILTERS

For Water Flood and Water Disposal

National Rapid Mechanical Filters are designed for both open and closed water disposal systems and water flood projects. Filteration capacity is from 2 to 3 gpm per sq. ft. of filter area. Backwash rates are from 12 to 20 gpm per sq. ft. of filter area.

National Filters are furnished in the following sizes:

4′ X 5′ • 5′ X 5′ • 6′ X 5′ • 7′ X 5′
8′ X 5′ • 10′ X 5′ • 12′ X 5′

Our Engineering Department welcomes inquiries concerning your water disposal problems.

It's a National®

NATIONAL TANK COMPANY

TULSA, OKLAHOMA

NO WONDER IT'S THE WORLD'S LARGEST SELLER

more than
10,000
O·C·T type "JE"
FLOW
CONTROLS
have been
installed

It is easy to see why the O-C-T type "JE" is the world's largest seller when you remember it is the only flow control that offers all these savings.

Low first cost. You can save as much as $300 on every tree when you use the O-C-T "JE".

Long life. The "JE" uses a heavy duty, hard-faced valve-type gate and seat assembly for long, trouble-free service.

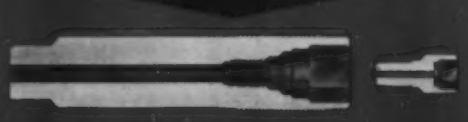
Low repair costs. One man can replace the entire valve and seat assembly in only five minutes.

Get the full story from your O-C-T representative. The O-C-T type "JE" flow control is available through all Christmas tree manufacturers and more than 700 supply store locations.

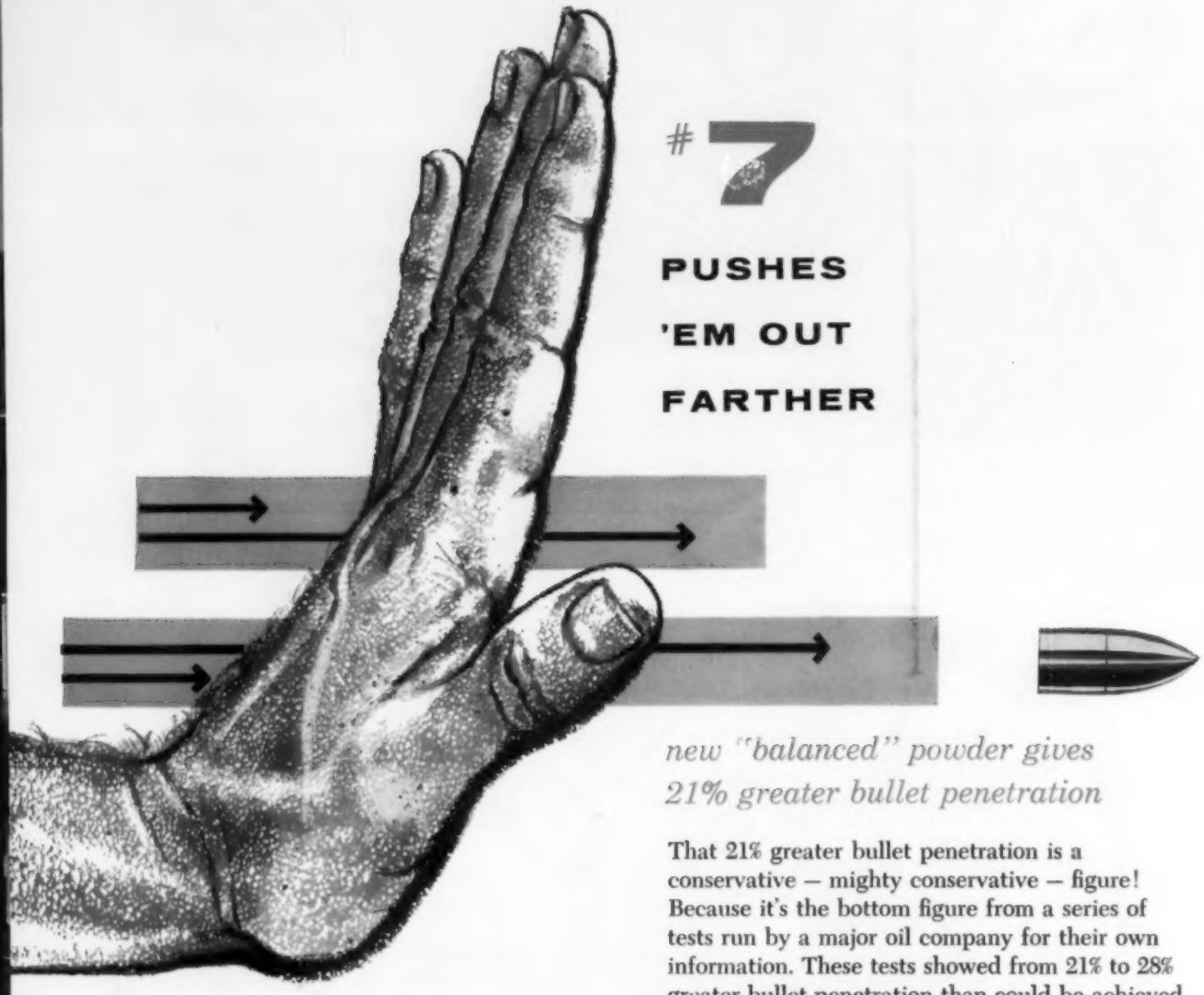
O·C·T

OIL CENTER TOOL CO.
P. O. Box 3091, Houston, Texas
Export Representatives: Sterling Areas.—Le Grand, Sutcliff & Gell, Ltd., Rochester, Kent, England. South America—East West Oiltools, C. A., Del Lago Hotel, Maracaibo, Venezuela. Address Export Inquiries for All Other Countries to P. O. Box 3091, Houston, Texas.

O-C-T CHOKES FOR EVERY WELL



O-C-T makes a complete line of positive and adjustable chokes of all sizes and pressure ratings. There is an O-C-T choke for every production situation.



#7

PUSHES 'EM OUT FARTHER

new "balanced" powder gives 21% greater bullet penetration

That 21% greater bullet penetration is a conservative — mighty conservative — figure! Because it's the bottom figure from a series of tests run by a major oil company for their own information. These tests showed from 21% to 28% greater bullet penetration than could be achieved with Lane-Wells #3 powder — and that was powerful powder, as the same tests showed. Lane-Wells new #7 powder is a new answer to the age-old ballistics problem of how to get more power behind the bullet without increasing the strain on the gun. #7 has been so formulated and "balanced" that it burns slower, with lower peak pressure, but *longer* . . . thus building up a tremendous "push" behind the bullet that drives it deeper into the formation. And there's no price premium for #7 powder — just another example of Lane-Wells efforts to give better service.

Tomorrow's tools — today!®

LANE WELLS COMPANY

General Offices, Export Office, Plant • 5610 So. Soto St., Los Angeles 58

LOS ANGELES • HOUSTON • OKLAHOMA CITY • LANE-WELLS CANADIAN CO. IN CANADA • PETRO-TECH SERVICE CO. IN VENEZUELA

FOREMOST IN QUALITY

For over 60 years, Jones has been so closely identified with every advance in design, manufacture and performance of sucker rod strings, it is only natural that the industry looks to Jones for the ultimate in quality and service.

JONES
SUCKER RODS

Look for the "GREEN" Rods

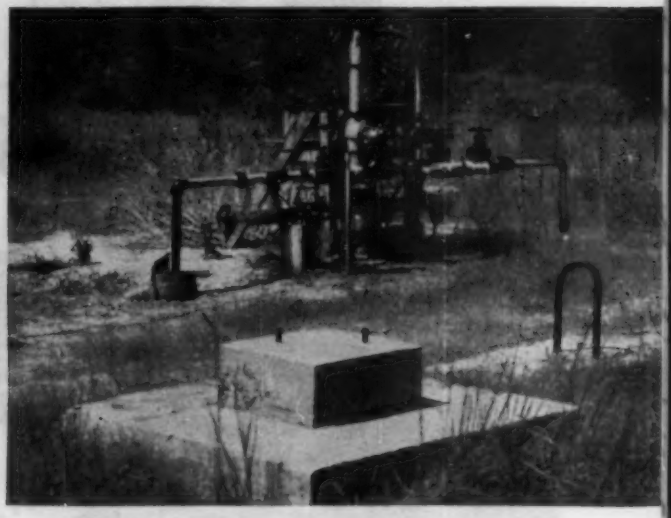
PESA
PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION
PARTNERS IN PETROLEUM PROGRESS

THE S. M. JONES COMPANY
Division of Buffalo-Eclipse Corporation

General Office and Factory: TOLEDO, OHIO
Sales Office: Kennedy Building, TULSA, OKLAHOMA
Export Sales Representatives: IDECO—Division of Dresser Equipment Company, Republic National Bank Building, Dallas, Texas and Chanin Building, New York City

Cemented with 'Starcor' in 1936

Original Cementing Jobs Still Holding Tight!



Typical of Lone Star Performance in Oil Field Service

Select Cement to Fit the job!

● Speaking of performance, and that's what counts in selecting an Oil Well cement, consider the truly outstanding record of 'STARCOR' Oil Well Cement under almost every conceivable condition—deep wells, high temperatures, high pressures, difficult squeeze jobs.

'Starcor' was first used extensively throughout the Rodessa field, northwest of Shreveport, in 1936-37. Oil men will find it significant that a large percentage of these wells still are producing—original cementing jobs holding tight, very little if any remedial work. Like the gas-distillate well (above, right) cemented with 'Starcor' in 1936, still flowing, and the oil well (left) on pump, still producing. Typical 'Starcor' performance in many important fields, yesterday and today.

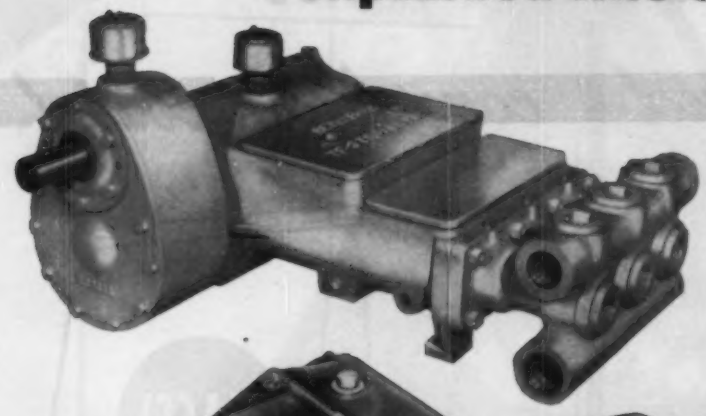
Lone Star offers you four great cements: LONE STAR Cement—a standard of high quality for over four decades . . . 'INCOR'*, America's first High-Early Sulphate Resistant Cement . . . 'STARCOR'* Slow Setting Oil Well Cement . . . 'TEXCOR'* Deep Oil Well Cement. Select the one that fits your job—that extra margin of quality means a lot.

*Reg. U. S. Pat. Off.

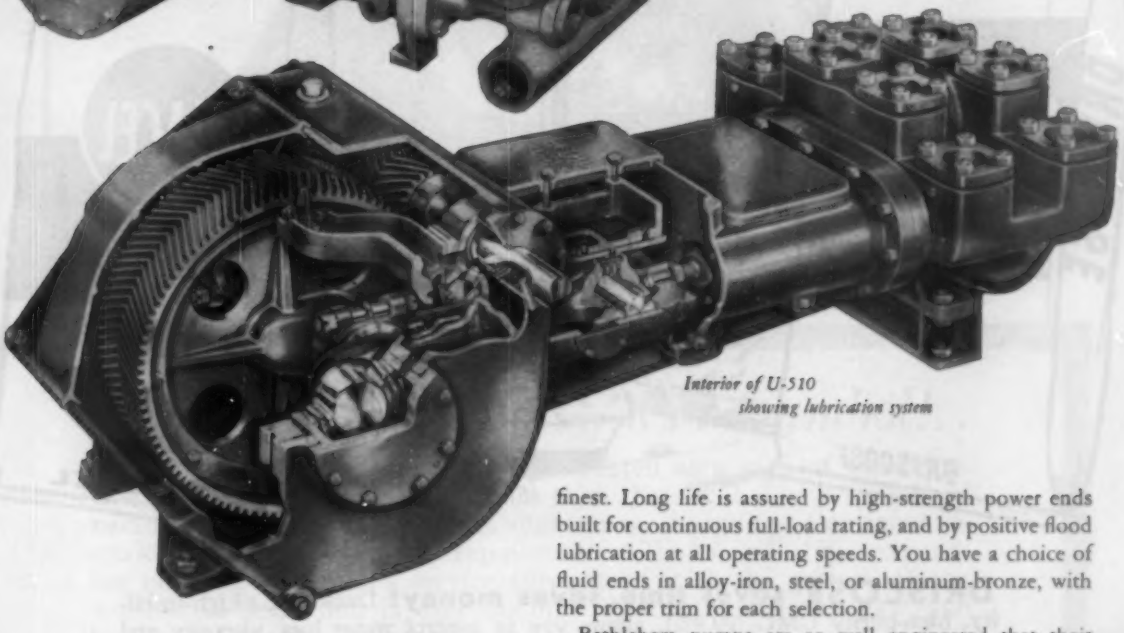
LONE STAR CEMENT CORPORATION

Offices: DALLAS • HOUSTON • ABILENE, TEXAS • NEW ORLEANS
KANSAS CITY, MO. • BIRMINGHAM • ALBANY, N. Y. • BETHLEHEM, PA.
BOSTON • CHICAGO • INDIANAPOLIS • NEW YORK • NORFOLK
RICHMOND • WASHINGTON, D. C.

Pick your "Handy Man" from this expanded line of power pumps



TP-3 Triplex Pump



Interior of U-510 showing lubrication system

Bethlehem now offers five distinct sizes of general-service pumps, so that it's even easier to pick just the right unit. We doubt that you've ever seen a line of pumps with so much versatility. Each is a "handy man"—a pump that can readily be adapted for several different kinds of work.

Does your job involve waterflooding? Salt-water disposal? Pumping crude oil in gathering systems or pipe-line service? Pumping mud or water for the drilling rig? If the answer is yes, there are Bethlehem units that will fit perfectly into your engineering plans.

You can bank completely on the quality of these pumps. Components are exhaustively tested. Materials are the finest. Long life is assured by high-strength power ends built for continuous full-load rating, and by positive flood lubrication at all operating speeds. You have a choice of fluid ends in alloy-iron, steel, or aluminum-bronze, with the proper trim for each selection.

Bethlehem pumps are so well engineered that their salvage value is always high. We feel certain that their many advanced features will interest you. If you will write or call, our people will gladly furnish complete information.

FIVE SIZES, DUPLEX AND TRIPLEX

Model	Type	Plunger Load, lb	Input Hp	Bore & Stroke, in.
U-33	Duplex	2400	14 @ 180 rpm	1¼ to 3 x 3
UA-46	Duplex	5000	40 @ 120 "	2½ to 4 x 6
U-510	Duplex	12000	100 @ 75 "	3 to 5½ x 10
TP-3	Triplex	3580	22.4 @ 250 "	1¼ to 2¼ x 3
TP-4	Triplex	5000	42 @ 250 "	2 to 4 x 4

BETHLEHEM SUPPLY COMPANY

General Offices: 21 E. Second St., Tulsa, Okla.
West Coast Headquarters: Los Angeles, Calif.
Export Distributor: Bethlehem Steel Export Corporation
25 Broadway, New York, N. Y.

BETHLEHEM SUPPLY

Use them **BOTH** *to reduce drilling and completion costs!*

DRISCOSE* saves time, saves money! DRISCOSE, a high-stability, high-purity CMC (99.9%), allows you to control water loss, viscosity and gel strength for optimum drilling conditions. At the same time, low pH, low solid DRISCOSE emulsions give you higher penetration rates. You save on operating time and on expensive bit replacements. DRISCOSE also helps avoid tight hole troubles. Consult our technical representative about your particular mud problems. Let him prove that DRISCOSE can save you money on your mud program.

DIACEL CEMENT SYSTEMS can save up to ¾ of the cement ordinarily required.** Using ordinary portland cement, you can control water loss and thickening time with a DIACEL Cement System. Versatile DIACEL systems give you a choice of densities from 10.5 to 17 pounds per gallon . . . to suit wells of all depths and wide temperature range. You can save up to 25% on cementing costs and get better drilling and completion work with a DIACEL System. Write for free technical handbook or call our technical representative.

*Driscose is a trademark for 99.9% pure Sodium Carboxymethylcellulose.

**A TRADEMARK

DRILLING SPECIALTIES COMPANY

BARTLESVILLE, OKLAHOMA

It's More Than A Sign—It's A *symbol!..*

Continental's "Green Triangle" was created as a sign of identification. But it has become much more than that. It is now a symbol of personnel integrity and product supremacy. It signifies Continental's modernization program to keep abreast of the oil industry's expanding needs. Continental's service paces itself with the growth of the world's oil fields and is excelled only by the search for new and better equipment.

Look to Continental for all your needs... all the time! You can always "Count on Continental."

▲*quality*

Quality products from outstanding manufacturers backed by Continental's 40-year reputation.

▲*service*

Time saving out-of-stock service from conveniently located stores saves you money.

CONTINENTAL SUPPLY COMPANY
A Division of The Youngstown Sheet and Tube Company
General Offices: DALLAS, TEXAS

TODAYS MOST VITAL...

PROFIT AREA

BURNS CASING HANGERS

KEEP UP YOUR PRESENT DRILLING COMMITMENTS
WITH LESS INVESTMENT PER WELL.
USE A CASING HANGER

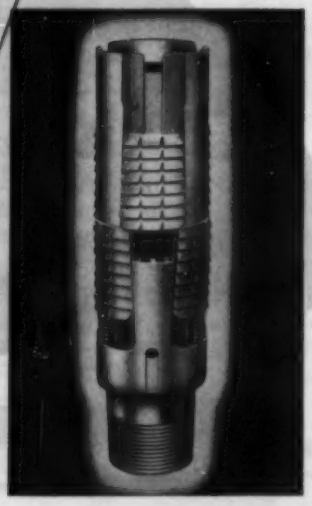
Here's the most profitable piece of equipment in the well drilling business today. What other single tool will effect savings up to 25% of well completion costs? Miles of costly pipe are saved with the Burns Casing Hanger because the overlap is eliminated.

You also assure a successful cement job which is the most critical operation in drilling and conditioning an oil well. The Burns Casing Hanger is an all purpose tool designed to:

1. SUSPEND WATER STRING
2. SUSPEND PROTECTIVE STRING
3. SUSPEND OIL STRING
4. SUSPEND LINER STRING

The success of the Burns Liner Hanger is built around the slip design. Instead of the conventional tapered cone used to force slips outward, the Burns patented construction provides specially broached single plane runners on which slips travel with a full 100% backup contact at all positions. No "two point" slip support and no cracked slips but instead a true 100% wedge—the Burns patent.

Thousands of Burns Casing Hangers are used today. Available in all popular sizes. Prices on request.



BURNS TOOL COMPANY

8346 SALT LAKE AVENUE — BELL, CALIFORNIA

M. D. "BUD" REHDERS COMPANY
P.O. Box 396, Farmington, New Mexico
Phone: Davis 5-9453 or 5-3773
Odessa, Texas Phone: Federal 7-0749

THORSON OIL TOOLS LTD. 7106 103rd Street
Edmonton, Alberta, Canada
Telephone 393-838

Also Sold Through Supply Stores

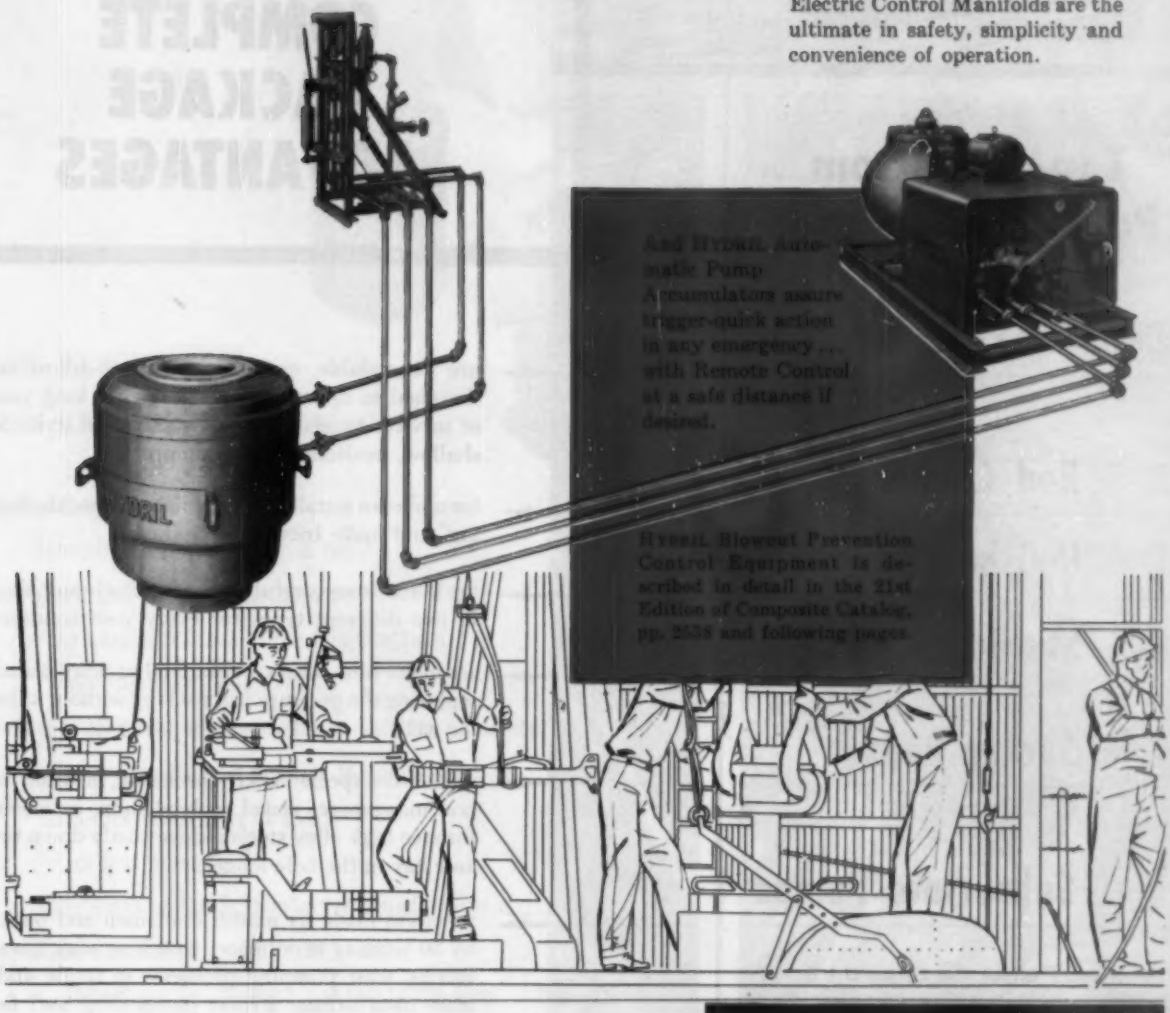
HYDRIL

TAKES THE "BLOW" OUT OF BLOWOUTS!

The HYDRIL System of Blowout Prevention Control provides faultless, foolproof control of threatening well pressures.

HYDRIL Blowout Preventers—Type "GK" or Type "MSP-2000"—are the most versatile of all blowout preventers.

HYDRIL Hydraulic or Hydraulic-Electric Control Manifolds are the ultimate in safety, simplicity and convenience of operation.



And HYDRIL Automatic Pump Accumulators assure trigger-quick action in any emergency . . . with Remote Control at a safe distance if desired.

HYDRIL Blowout Prevention Control Equipment is described in detail in the 21st Edition of Composite Catalog, pp. 2538 and following pages.

HYDRIL COMPANY

714 W. OLYMPIC BLVD., LOS ANGELES 15, CALIF.

FACTORIES AT

LOS ANGELES; HOUSTON, TEXAS; YOUNGSTOWN, OHIO; ROCHESTER, PA.

HYDRIL SALES OFFICES

California: Bakersfield, Los Angeles, Ventura; **Louisiana**: Harvey, New Iberia, New Orleans; **Oklahoma**: Tulsa; **Pennsylvania**: Rochester; **Texas**: Corpus Christi, Dallas, Houston, Midland, Odessa; **Wyoming**: Casper; **Canada**: Calgary, Edmonton

It pays to buy EMSCO D+B COMPLETE PACKAGE ADVANTAGES

Top-to-Bottom Pumping Package

EMSCO Pumping Units — are dependable, economical, easy-to-adjust and designed to operate economically for long years of service. Available in many sizes and styles for shallow, medium or deep pumping.

D+B Rod Clamps — for one-man installation. Eliminate "knuckle busting" and make friends everywhere.

D+B Polished Rods — are made from carefully selected steels and alloys in five different types for every well condition.

D+B Stuffing Boxes — are major time savers. Use of dual packing permits replacing the pressure seal packing without killing the well.

D+B Sucker Rods — made from special nickel-chromium, medium carbon manganese, nickel molybdenum, or electric furnace high alloy steels reduce costly down time and stay in the hole longer.

D+B Subsurface Pumps — precision made by master craftsmen and backed by 50 years of experience, go a long way toward solving your pumping problems in single and 2 zone installations. Expert pump shop and field service on a 24-hour basis is available in all the major oil fields.

Learn more about the Emsco D+B Top-to-Bottom pumping package.

Consult the friendly people in your nearest Continental or D+B store.

CONTINENTAL

Serving the Oil and Gas Industries

CONTINENTAL SUPPLY COMPANY

A Division of The Youngstown Sheet and Tube Company

General Offices: Dallas, Texas

Representatives in all principal oil fields of the world

D+B

QUALITY IS OUR PRODUCT

EMSCO

TRADE MARK

EMSCO MANUFACTURING COMPANY

Garland, Tex. • LOS ANGELES, CALIF. • Houston, Tex.

General Sales Offices: Dallas, Texas

SR 608

HARD OR NOT —

NOW SCHLUMBERGER CAN CORE IT!

Schlumberger side-wall cores, familiar to every operator in the Gulf Coast and California can now be obtained in the hard-rock areas of the Mid-Continent and the Rocky Mountains.

Recent technical improvements on both the Schlumberger gun and core barrel have made it possible to core many hard-rock formations of 15% or less porosity.

Operations of the Schlumberger Sample Taker is rapid and economical . . . up to 30 zones of interest can be cored on one trip in the hole . . . the cores are 1 – 3/16 inches in diameter and a maximum of 2 – 1/4 inches long.

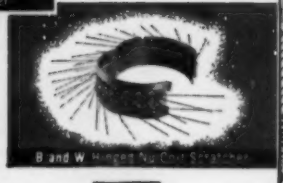
The Schlumberger sample taker is simple . . . it's safe . . . it's proved by thousands of runs to be the fastest and most dependable way of taking a close look at your production possibilities.

THE EYES OF THE OIL INDUSTRY **SCHLUMBERGER**

Well Surveying Corporation

B and W SCRATCHERS and CENTRALIZERS

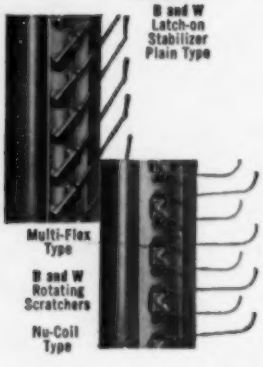
B and W Multi-Flex Scratcher



B and W Hinged Nu-Coil Scratcher

B and W Latch-on Centralizer with Kon-Kave Bow

B and W Latch-on Stabilizer Plain Type



Multi-Flex Type

B and W Rotating Scratchers

Nu-Coil Type

First in the Field...

For a Good Cement Job

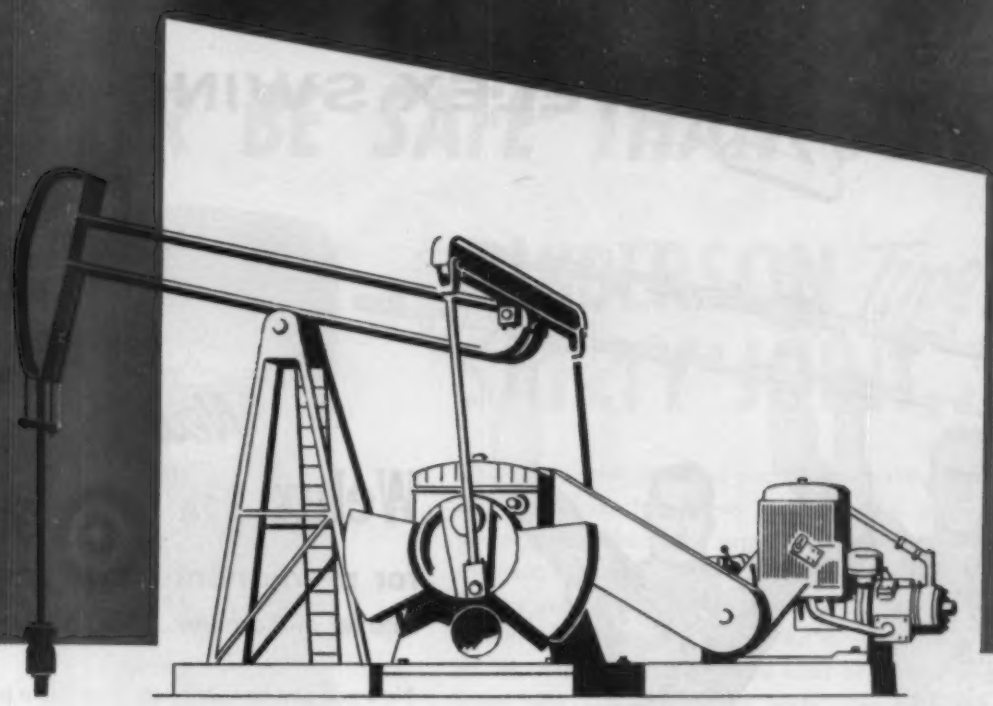
B and W originated and pioneered the LATCH-ON-CENTRALIZER for easy installation . . . the KON-KAVE Bow for greater centering strength . . . the WALL CLEANING GUIDE . . . the MULTI-FLEX and HINGED NU-COIL SCRATCHERS FOR POSITIVE MUD REMOVAL and COMPLETE CEMENT FILL.

In the drilling of oil wells, mud cakes are formed on the permeable formations. Cement slurry will only bond with the formations when the mud cakes have been "scratched off" the wall of the hole.

B and W Incorporated

Well Completion Specialists

GULF COAST	WEST COAST
Box 5266	Box 3751
Houston 12, Texas	Los Angeles 54, Calif.
Phone WAlnut 3-6603	Phone DAvis 4-1106



HOW TO LOWER PRODUCTION COSTS:

Power your pumper

WITH *Ajax and Gas*

The fog of questions about rising production costs and narrowing profit margins can be swept away by a single sunlit fact: you can usually save half the cost of your engine each year with AJAX and gas! After two years, you have only negligible maintenance and fuel to pay for—from then on out, years of continued profit. More facts? Write us—see your Supply Man!

AJAX

Ajax

IRON WORKS

Builders of GAS AND OIL ENGINES, PRESSURE PUMPS, STEAM DRILLING ENGINES, INDUSTRIAL STEAM ENGINES

CORRY, PENNSYLVANIA

Oil Field Distributors: THE NATIONAL SUPPLY CO., PITTSBURGH, PA. • R. B. MOORE SUPPLY CO., BOLIVAR, N. Y. • BETHLEHEM SUPPLY CO., TULSA, OKLAHOMA

Now there are **2** **WELEX SWING JETS**

New Welex 1⅜" *Swing-Jet*

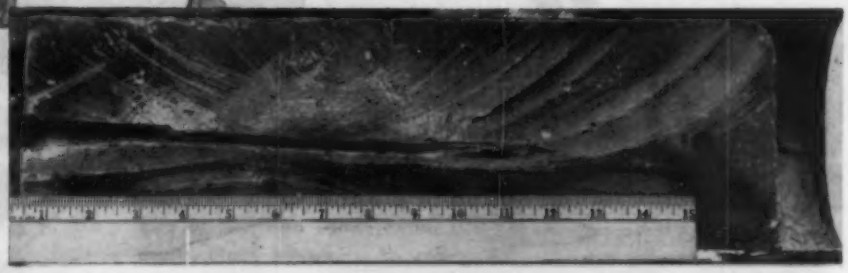
for permanent-type completions

smaller in diameter . . . equivalent in power

Now you can be sure of *truly effective* penetration in small I.D. casing with the New Welex 1⅜" ***Swing-Jet***

This new jet gives you penetration equivalent to tubing guns of larger diameter . . . except its big brother . . . the Welex 1¾" ***Swing-Jet***

Delivering five shots a foot, the 1⅜" ***Swing-Jet*** offers the added advantage of less debris and quicker cleanouts — order it for your next permanent-type completion.



Unretouched photo of 1⅜" Swing Jet target. Firing through ⅜" steel into 7-day cement and providing 9½" of penetration with ⅜" entrance hole.

Perforating is no sideline with Welex!

Welex
JET SERVICES, INC.

SALES OFFICES: DALLAS • DUNCAN • WICHITA

DIVISION OFFICES: HOUSTON • MIDLAND • TULSA • OKLAHOMA CITY • DENVER

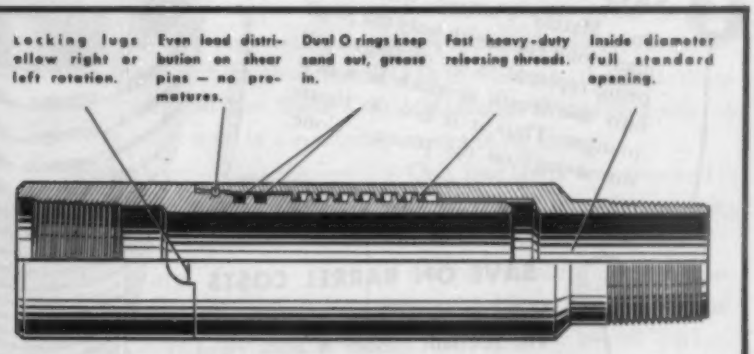
DISTRICT OFFICES: ABILENE • ARDMORE • BEAUMONT • CORPUS CHRISTI • FALFURRIAS FARMINGTON • FORT MORGAN • GREAT BEND • HOBBS • HOUMA • HOUSTON • LAFAYETTE LAKE CHARLES • LIBERAL • ODESSA • PAMPA • PAULS VALLEY • PAWHUSKA • PLAINVILLE SAN ANGELO • SHAWNEE • SHERMAN • SNYDER • STILLWATER • WICHITA FALLS • WINFIELD

GENERAL OFFICES: 1400 E. Berry Street, Fort Worth, Texas

BETTER BE SAFE THAN SORRY!

GUIBERSON *Type A* SAFETY JOINT

This safety joint gives you positive protection under any well condition. It releases quickly — but *only* when you're ready. Shear pins support only the weight *below* the joint, so you can depend upon them to shear with the *correct tubing pull* at the joint. Available in 16,000, 22,000 and 30,000 lb. shear point strengths, with right or left hand release. For the kind of protection that keeps you safe, instead of sorry, depend upon the best — Guiberson.


Locking lugs allow right or left rotation.
Even load distribution on shear pins — no premature.
Dual O rings keep sand out, grease in.
Fast heavy-duty releasing threads.
Inside diameter full standard opening.

Back-Off Safety Joints — Guiberson has two types of back-off safety joints — Type B and Heavy-Duty Type F. Both are available with either right or left hand release and both are modestly priced.

THE
GUIBERSON
CORPORATION

ESTABLISHED 1919 • DALLAS, TEXAS, U. S. A.

Sold By Leading Oil Field Supply Stores Everywhere

Double-Barreled SAVINGS . . .

when you use

MARTIN PLUNGERS

1 SAVE ON PLUNGER COSTS

One Martin Plunger will make many long runs, with only the rings being replaced. A set of rings costs only one fourth as much as a new plunger. Thus it is easy to figure the savings on the plunger alone.

2 SAVE ON BARREL COSTS

Metal to metal wear is eliminated. The resilient rubber & duck rings are so much easier on the barrel surface that barrels usually last several times longer. Here too is an important item in pump costs.

MORE BARRELS IN THE TANK TOO because of better seal, freer travel in the barrel and longer runs. AVAILABLE for your pump and your well, regardless of diameter, or depth or well condition. Get catalog No. 4 and read how to make selection and installation.

MARTIN PLUNGERS ARE SOLD THRU SUPPLY COMPANIES

JOHN N. MARTIN

Manufacturer

9 W. BRADY • TULSA, OKLA.

Over
60
Locations in the United States and Canada

McCullough REPORTS TO THE OIL INDUSTRY

Service
Anywhere Anytime

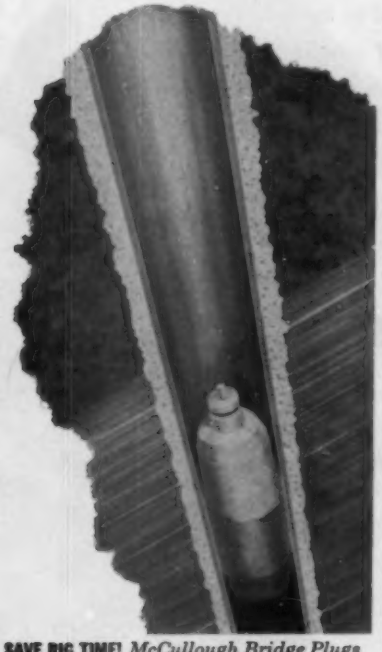
New Services • • • New Tools • • • New Methods • • • Outstanding Results

McCullough Bridge Plug Drills Out in Two Hours Forty-five Minutes

A 4½" O.D. McCullough Bridge Plug was set in 5½" O.D. casing at 2800' to squeeze off a hole in the casing. Two previous attempts by other type plugs had not been successful.

Operator drilled out the McCullough Plug in two hours and forty-five minutes with a Reed Rock Bit that had previously drilled through 130' of cement on top of the plug.

A production packer was then set below the point where the plug had been drilled out without difficulty of any kind.



SAVE RIG TIME! *McCullough Bridge Plugs run faster, set easier, drill out quicker.*

McCullough Bridge Plug Set at 12,420' in Only 4 Hours

17.6 lb. Mud and 11,400 lb. Hydrostatic Pressure at Setting Depth No Problem for McCullough Bridge Plug

Typical of trouble-free operation under severe well conditions was the setting of this McCullough Bridge Plug in a deep Louisiana well.

Plug setting depth was at 12,420' in 5" O.D. 18 lb. liner where it was necessary to do a squeeze job. Hole was full of 17.6 lb. per gallon mud and hydrostatic pressure at operating depth was approximately 11,400 lbs.

Because of its short length and small O.D. in relation to the inside diameter of the casing and liner, the 4" O.D. McCullough Bridge Plug was run through the heavy mud in a minimum amount of rig time.

Only four hours were required to complete the job including rigging up and tearing down.

During the entire operation there was no trouble, no delay of any kind. Since slips, reins, rubber packers and other moving parts have been eliminated in the McCullough Bridge Plug, there was no danger of hanging up and setting prematurely —even when entering the restricted I.D. of the 5" liner where a slip-type plug might have failed.

The McCullough Bridge Plug provided a leak proof, metal-to-metal seal at 12,420' under the heavy hydrostatic load to the operator's complete satisfaction. The squeeze job was completed as a routine, trouble-free operation.

McCullough Bridge Plug Easily Passes Tight Spot in Casing

Due to the small outside diameter and short length of the McCullough Bridge Plug, it easily passed through a tight spot in the casing where a plug of another make failed.

Casing was 5½" O.D. 15½ lb. Plug setting depth was 3315'. A slip-type bridge plug was run, but would not pass through a tight spot in the casing at 130'. After this failure, a 4½" O.D. McCullough Bridge Plug was run. It passed the tight spot without difficulty and was securely set at the required depth—total time on the job; only one hour.

McCullough TOOL COMPANY

Cable Address: MACTOOL

LOS ANGELES
HOUSTON
EDMONTON

Johnston is tops in testing

and here's why

This is the day of specialization, and Johnston's specialty is obtaining for you the most accurate formation data possible, short of making a permanent completion. Our every effort is to improve the mechanical design of our instruments and make our field service organization more valuable to you.

Johnston has the advantage of experience, too . . . experience dating from 1927. Founded on Drill Stem Testing, the Johnston organization has grown by excelling year after year in this important service.

Johnston equipment and methods are backed by the most extensive engineering research group in the field of subsurface testing. Tangible evidence of this is the exclusive Johnston Tension Type Pressure Recorder which is so sensitive it faithfully records pressure changes of as little as 5/100 of 1 per cent. A built-in thermometer and extra inches of deflection in the tension member (which also has an extremely low thermal coefficient), combine to make this by far the most consistently accurate formation pressure recorder.

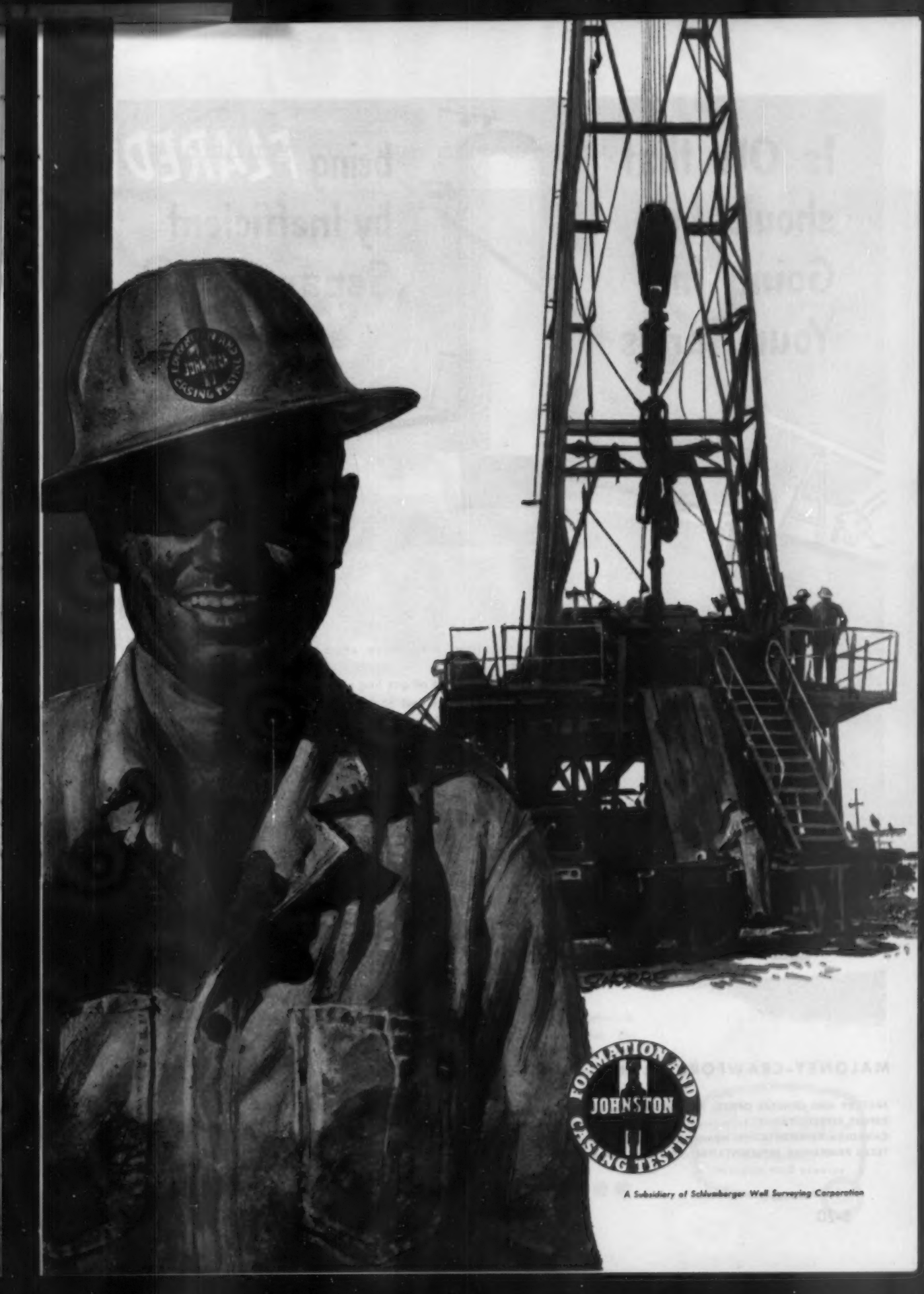
JOHNSTON TESTERS

first in drill stem testing

P. O. BOX 98,

HOUSTON, TEXAS

LOS ANGELES, CALIF. • CALGARY, CAN.



FORMATION AND

JOHNSTON

CASING TESTING

A Subsidiary of Schlumberger Well Surveying Corporation

Are you troubled with these effects of off-brand and inefficient equipment:

1. Oil flared out of gas line onto farmer's field.
2. Cheap valves and controls, that blow gas into storage tanks, thus creating a fire hazard and an unsightly, oil splotched, tank battery.
3. Looks the same as others, but lacks vital engineering experience behind the design of its hidden inner parts.
4. Orphan separators you are forced to service yourself, often with makeshift parts.

There's a Maloney-Crawford separator designed to handle every known separation problem efficiently. All designs are checked for efficiency by field observation of the oil and gas action in a transparent plastic separator.

Maloney-Crawford seperators are equipped with the finest accesssories and repair parts, and service is immediately available.

Also, producers have found that they can buy M-C's recommended size with assurance, instead of buying, as is often done, the next largest size to be sure it will handle the production.

Call a M-C representative whenever you have a separation problem.

MALONEY-CRAWFORD TANK & MANUFACTURING CO.

FACTORY AND GENERAL OFFICE: 38 North Peoria — Box 659 — Tulsa, Oklahoma
EXPORT REPRESENTATIVE: Baird Lines, 1037 Grand Central Terminal Building, New York, N. Y.
CANADIAN REPRESENTATIVE: Maloney-Crawford Tank & Service Company, Ltd., Edmonton, Alberta
TEXAS PANHANDLE REPRESENTATIVE: Atlas Tank Company, Pampa, Texas

MALONEY-CRAWFORD TANK & MFG. CO.

It takes a complete team to keep dependable drilling mud service available for you

Meet this Magcobar Man, the member of the team who actually delivers the goods

Your Magcobar Dealer has hitched his future to the oil industry. He's an independent, local businessman who has elected to represent Magcobar in the field because he's convinced of the quality, resources and field service facilities in which Magcobar has invested millions of dollars to back up his stocks of materials. When you need mud, look for the Magcobar Dealer. He's the "front man" of a complete Magcobar team. He's ready to serve you with the most complete line of drilling mud products and service in the field.

Magcobar
Complete
DRILLING MUD SERVICE

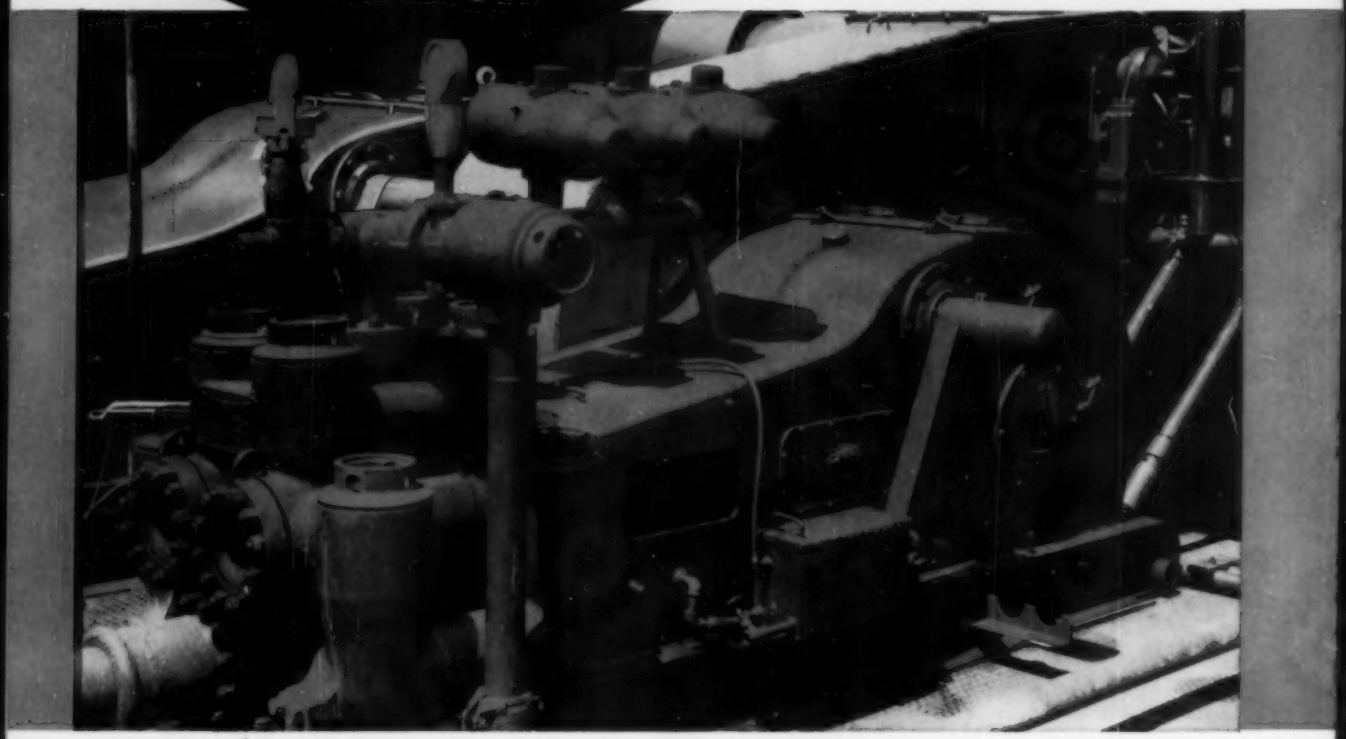
MAGNET COVE BARIUM CORPORATION

Houston, Texas

Tough · Dependable · Portable

EMSCO SLUSH PUMPS

outperform all others per pound of weight



✓ CHECK THESE MONEY SAVING FEATURES!

Call today for bulletins and complete information

- ✓ ***Exceptional Performance*** Emsco Slush Pumps deliver more horsepower per pound with greater economy and are easy to transport.
- ✓ ***"Exposed" Liner*** Patented Emsco "exposed" liner design minimizes fluid end "washouts" caused by liner packing failures.
- ✓ ***Compact Design*** Because of compact design Emsco Pumps cost less money to move.
- ✓ ***Easy-to-Service*** Operation and maintenance are easy and simple. There are no adjustments to be made – no greasing to be done – lubrication is completely automatic.
- ✓ ***Available Sizes:*** D175, D300, DA500, D700, D850, D1000.

QUALITY IS OUR PRODUCT

EMSCO TRADE MARK

EMSCO MANUFACTURING COMPANY

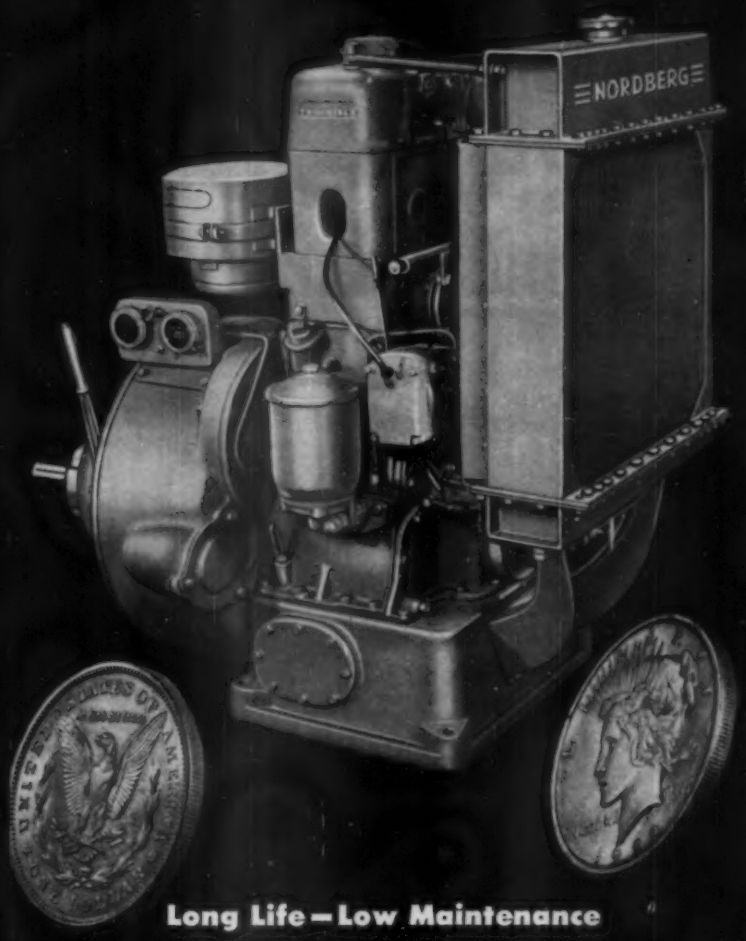
Garland, Tex. • LOS ANGELES, CALIF. • Houston, Tex.

General Sales Offices: Dallas, Texas

Distributors: Bovaird Supply Company, Tulsa, Oklahoma
Mid-Continent Supply Company, Fort Worth, Texas

Export distributor: Mid-Continent Supply Company, Inc.,
45 Rockefeller Plaza, New York 20, N.Y.

SP 608



DOLLAR FOR DOLLAR...

NORDBERG

POWER CHIEF®

ENGINES

are your Best Buy for Oil Field Service

Long Life—Low Maintenance

These two important factors in the long run justify the soundness of your original investment in oil field pumping engines.

Before you buy your next engine consider the many service histories of Nordberg *Power Chief* engines that show over 30,000 hours of continuous pumping operation, with the original rings, pistons, liners, bearings and crankshaft still in place . . . this is real proof of value received for dollar invested.

Add to this the many "extras" such as enclosed clutch power take off and safety shut down control that are included as standard equipment on *Power Chief* engines and you will see why you save by specifying *NORDBERG*.

NORDBERG MFG. CO., MILWAUKEE, WIS.

CONDENSED SPECIFICATIONS

	ONE CYLINDER	TWO CYLINDER
Bore & Stroke	4½" x 5¼"	4½" x 5¼"
Piston Displ.	83.5 cu. in.	167 cu. in.
Compression Ratio	6 to 1	6 to 1
Speed Range	800 to 1800 rpm	800 to 1800 rpm
Horsepower	18 hp, max.	36 hp, max.

For complete specifications and literature, mail the coupon today.

NORDBERG

DIESEL • DUAFUEL® AND SPARK-IGNITION GAS ENGINES

Available at your local Supply Store or contact these Authorized Distributors:
SOUTHERN ILLINOIS—Stephens Oil Field Repair, Fairfield, Illinois
KANSAS—Mead Engine & Welding Works, Sterling, Kansas
OKLAHOMA—Cornelison Engine Maintenance Co., Inc., Seminole, Oklahoma
HOUSTON & GULF COAST—Diesel Engine & Equip. Service Co., Houston, Texas
LOUISIANA & MISSISSIPPI—Rogers Diesel Engineering Co., New Orleans, La.
WILLISTON—Tractor & Equip. Co., Sydney, Montana
COLORADO—JULESBURG—Mead Engine & Welding Works, Sterling, Colorado
SOUTHERN CALIFORNIA—Ja-Mar Co., Wilmington, California

MAIL THIS COUPON TODAY

Nordberg Mfg. Co., Milwaukee, Wisconsin

Send specifications sheets on Nordberg *Power Chief* engines to:

Name_____

Company_____

Address_____

City_____ Zone____ State_____

© 1956, Nordberg Mfg. Co.

4-456-0

MARVEL INVERSE OILER-

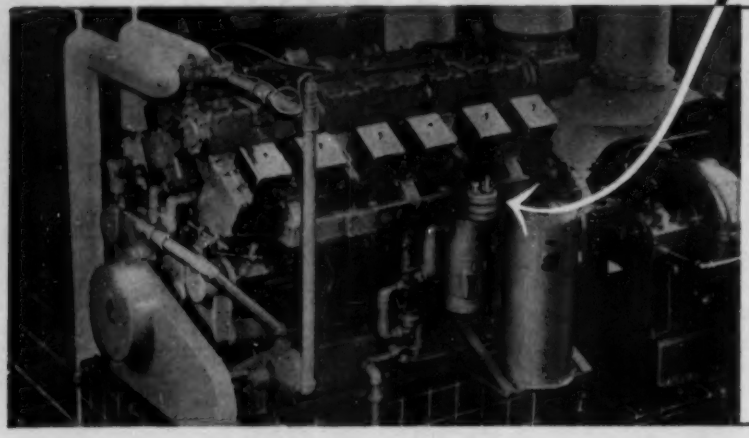
Vital Part of World's Finest Engines

Engine manufacturers think so highly of the Marvel Inverse Oiler they have incorporated it as a vital unit in their engines' lubrication systems.

They have found that engines, equipped with Marvel Inverse Oilers, can be depended upon to give quick acceleration to save trip time . . . keep operating costs to a minimum . . . guarantee hours of continuous performance . . . keep "down-time" low by extending periods between overhauls.

The famous Climax Engines, one of which is pictured below, is an example. A truly fine performer, it is equipped with a Marvel Inverse Oiler for Marvel Mystery Oil—finest performing lubricant of all.

The Marvel Inverse Oiler feeds Marvel Mystery Oil in exact proportion to engine speed and load . . . properly lubricating valves and guides, preventing wear and sticking. Keeps upper piston rings free in their grooves . . . retards ring flutter . . . and cushions ring pounding which can result in ring breakages. Remember, it is the *oil* which must do these things and only Marvel Mystery Oil is blended for this purpose and for this oiler.



The Marvel Inverse Oiler

is an integral part of the Climax 12 cylinder, 171 H.P., 600 RPM GAS ENGINE. Operating off the intake manifold, this completely automatic Oiler feeds Marvel Mystery Oil exactly in proportion to engine loads . . . gives direct protection to the all-important upper cylinder areas.

This Chart shows the proper setting for constant load engines

BRAKE H. P. AT BELT	NAT. GAS CU. FT. PER HOUR	BUTANE GALLONS PER HOUR	GASOLINE GALLONS PER HOUR	M. M. OIL DROPS PER MIN.	M. M. OIL HOURS PER QUART
10	115.	1.07	1.12	4	228
15	172.5	1.60	1.68	6	152
20	230.	2.14	2.24	8	114
25	287.5	2.67	2.80	10	91
30	345.	3.21	3.36	12	76
35	402.5	3.74	3.92	14	65
40	460.	4.28	4.48	16	57
45	517.5	4.81	5.04	18	50
50	575.	5.35	5.60	20	45
60	690.	6.42	6.72	24	38
70	805.	7.49	7.84	28	32
80	920.	8.56	8.96	32	28
90	1035.	9.63	10.08	36	25
100	1150.	10.70	11.20	40	22
120	1380.	12.84	13.44	48	19
140	1610.	14.98	15.68	56	17
160	1840.	17.12	17.92	64	14
180	2070.	19.26	20.16	72	12
200	2300.	21.40	22.40	80	11
225	2587.5	24.00	25.20	90	10
250	2875.	26.75	28.00	100	9
275	3162.5	29.42	31.10	110	8
300	3450.	32.10	33.60	120	7

Chart shows total oil consumption

EXAMPLE:—If you use 805 cu. ft. of dry gas, 7.49 gallons of butane or 7.84 gallons of gasoline, your H.P. is about 70, so adjust oiler to feed 28 drops per minute. You will then receive about 32 hours per quart of MARVEL MYSTERY OIL.

If engine load increases after setting for normal load, oiler will automatically increase its feed, decreasing when load is lessened.

To determine drop count per oiler when more than one is used on an engine—divide recommended drop count by number of oilers.

NOTE: Guarantee on oiler is void if any other oil than MARVEL MYSTERY OIL is used. Some *engines* also carry this guarantee policy.

See Your Local Jobber or Oil Well Supply House

EMEROL MFG. CO.

Dept. 431, 242 West 69th Street New York 23, N. Y.

In 1930, EASTMAN ORIGINATED CONTROLLED DIRECTIONAL DRILLING SERVICE. Much valuable experience has been gained since. Notable among our achievements has been the development of multiple well programs from land locations. And, as early as 1948, Eastman pioneered and put into practice the same techniques in offshore directional drilling in the Gulf of Mexico.

Consequently, our "know-how" helps operators decrease expensive rig time in marine directional drilling, sidetracking, and subsurface bore hole surveying.

Eastman is the only service company with a full-time research and development department devoted exclusively to directional drilling and surveying problems.

Our knowledge and experience is available to you. It's as close as your telephone. Call the Eastman office nearest you.

DIRECTIONAL DRILLING Eastman OIL WELL SURVEYS

EASTMAN OIL WELL SURVEY COMPANY

LONG BEACH • DENVER • HOUSTON

Export Sales and Service:
EASTMAN INTERNATIONAL COMPANY
P. O. Box 1500 • Denver, Colorado, U. S. A.

FRACTURE
ACIDIZE
SWAB *and* TEST

as many intervals as required

... in one round trip

Product No. 677-C

with BAKER RETRIEVABLE BRIDGE PLUG *and...*

SETS AND PACKS OFF AGAINST PRESSURE DIFFERENTIALS FROM EITHER ABOVE OR BELOW

After the Retrievable Bridge Plug has been run to the desired depth and released, it will automatically set and pack off against pressure differentials established from either above or below the tool.

CAN BE RUN IN AND RETRIEVED EASILY... OR MOVED AND RESET AS MANY TIMES AS REQUIRED

The number of times that the Retrievable Bridge Plug can be released, moved and reset is limited only by the number of operations in the well that require its use.

NUMEROUS ECONOMICAL APPLICATIONS

Used WITH the Baker Full-Bore Retrievable Cementer for:

(a) *Straddle Operations*
The distance to be straddled is not limited by the made-up length of tool.

(b) *MULTIPLE Zone or Selective Testing, Fracturing, Acidizing*

Used BY ITSELF for:

(a) "Down-the-casing" Fracturing or Acidizing

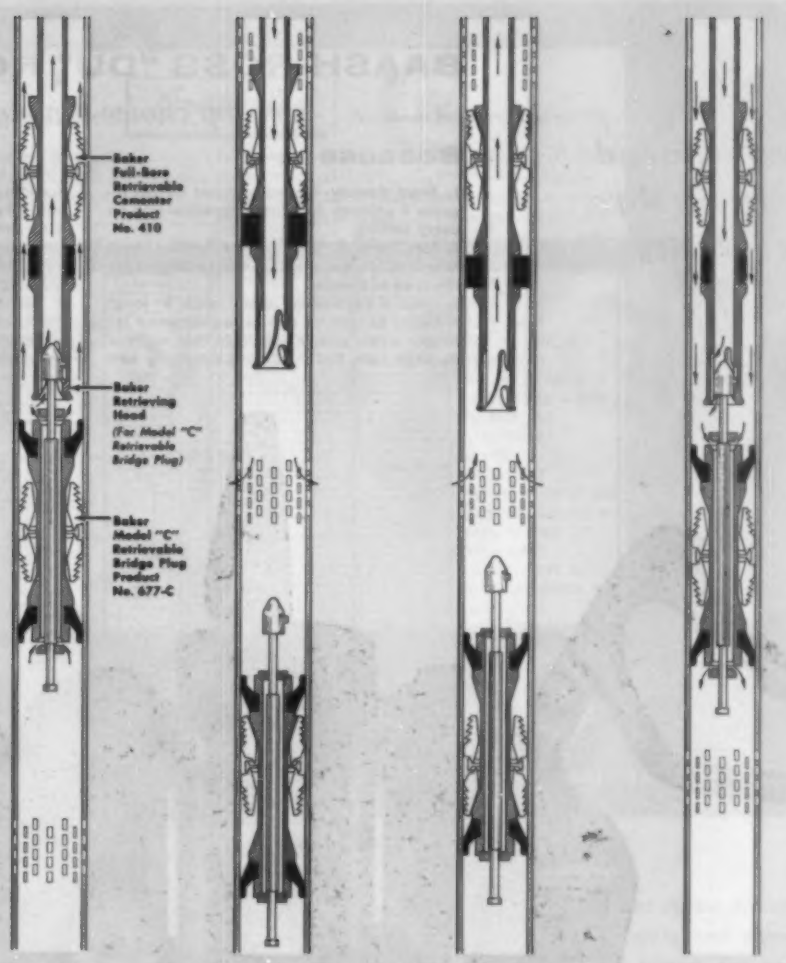
(b) Testing operations

(c) Temporary pressure containment to permit repair to or removal of well head equipment with safety.

Write for Catalog Supplement No. 319 for complete information on

TYPICAL OPERATION

Product No. 410


Baker Full-Bore Retrievable Cementer Product No. 410
Baker Retrieving Head (For Model "C" Retrievable Bridge Plug)
Baker Model "C" Retrievable Bridge Plug Product No. 677-C

RUNNING-IN
Retrievable Bridge Plug being run into well on bottom of Full-Bore Cementer through use of Retrieving Head. Note fluid by-pass.

FRACTURING OR ACIDIZING
Plug should be pressure tested after release. Cementer is released, raised above perforations and reset for pressure operations.

SWABBING, TESTING
Note how the reversal of pressure differential has transferred load from one set of slips to the other (both cementer and plug).

RETRIEVING
Plug and Cementer being moved to next set of perforations—or retrieved from well. Valves in plug open to permit fluid by-pass.

BAKER FULL-BORE RETRIEVABLE CEMENTER

HOLDS PRESSURE FROM EITHER ABOVE OR BELOW

Two sets of opposed slips enable the cementer to hold pressure from either above or below. Casing can be tested before squeeze—and the tubing also, if the Baker Full-Bore Tubing Tester is used.

FULL BORE CONSTRUCTION

Permits Passage of Tubing Perforators or Instruments—Assists in Preventing "Screen-Out" on Fracturing Jobs

The Full Bore through the Cementer (and Tester if used) is in reality a continuation of the bore through the tubing.

This continuous full ID passage not only permits passage of tubing perforators or instruments but assists in preventing "Screen-Out" (sand dropping out of the oil) and subsequent plugging of the tubing in fracturing jobs.

IDEAL STRADDLE TOOL WHEN USED WITH BAKER RETRIEVABLE BRIDGE PLUG

The operation of the Cementer setting mechanism makes it easy (through the use of the Retrievable Bridge Plug Retrieving Head) to release and pick-up the Baker Retrievable Bridge Plug. It is in fact the ideal partner to the Retrievable Bridge Plug for selective multiple-zone or single-zone operations.

these products and their application

BAKER OIL TOOLS, INC.
HOUSTON • LOS ANGELES • NEW YORK

The most advanced rotary slips in the industry...

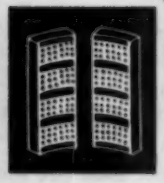
BAASH-ROSS "DU" ROTARY SLIPS

are top choice among oil men

Because...

1. Their flexibly-hinged unitized design insures a uniform, full-circumferential grip on every setting.
2. Size for size, they are the lightest, best balanced slips available, and are easiest for the crew to handle.
3. Unique segmented liners (each 4" long) are easy to replace, can be re-positioned for longer wear, give a safe grip that will not damage pipe. For maximum simplicity and economy in stockroom, same segments fit both "Regular" and "Long" bodies.
4. By simply changing liners, same body fits wide range of pipe sizes. (Only two body sizes needed to fit all tubing, drill pipe and casing from 2⅜" through 7" O.D.)!
5. Two lengths—12" (Regular) for wells to 8000' deep. 16" (Long) for deeper wells—cover all requirements, including the longest and heaviest drill strings.

Scientifically-cored backs minimize weight without reducing strength.



Standardized liner segments are easily replaced.

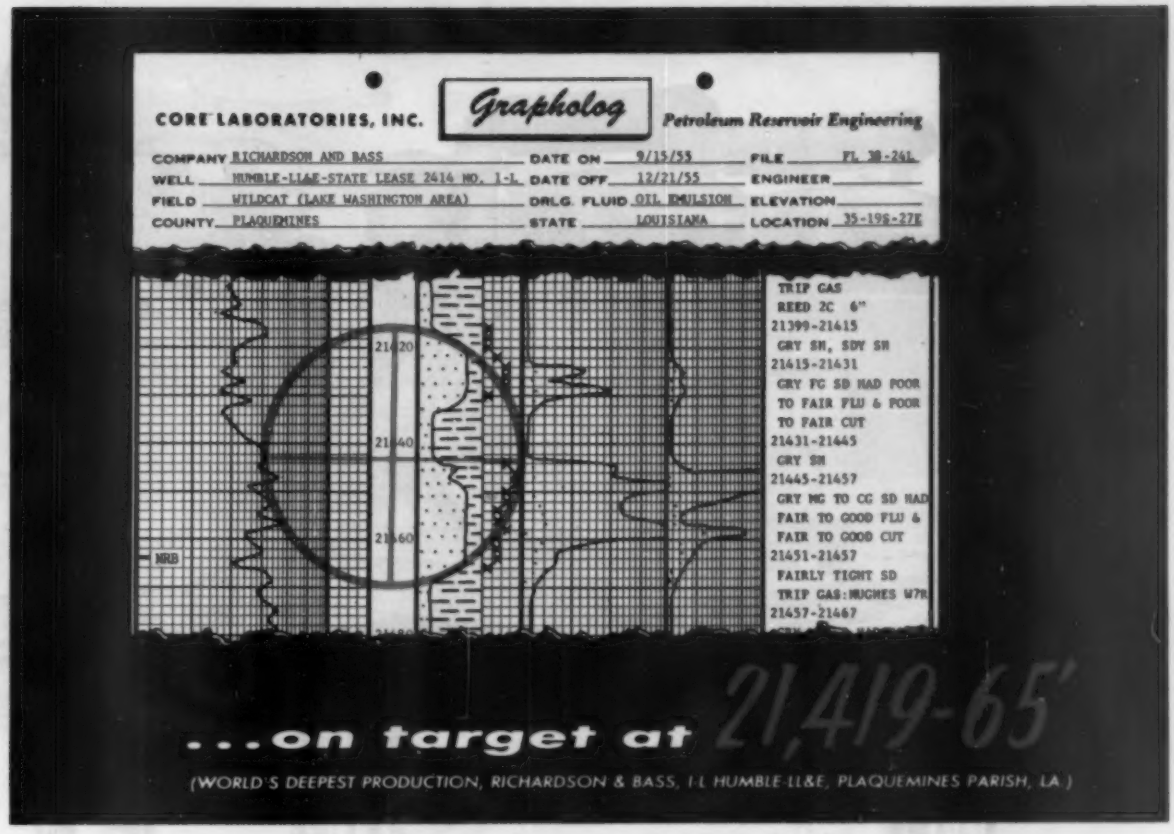
Safety handles protect crew against injury.

"Floating Hinge" rigidly maintains vertical alignment, permits lateral adjustment to irregularities.

BAASH-ROSS TOOL COMPANY

DIVISION OF JOY MANUFACTURING COMPANY

Los Angeles, Calif. • Houston, Texas • Odessa, Texas • Oklahoma City, Okla. • Casper, Wyo. • Olney, Ill. • Edmonton, Alb., Canada • New York City



Core Lab was there, too! In coordination with the fine services and equipment of other firms, a Core Lab Well Logging unit worked Richardson and Bass' now-famous depth-record-breaker — 1-L Humble-LL&E, Plaquemines Parish, Coastal Louisiana. *And, out of a total of 22,570 wildcat feet drilled, the Core Lab crew pinpointed the present 46-foot completion interval.*

The basic purpose of Core Lab's Well Logging Service, as a modern derrick-side aid in the search for new oil, is two-fold. First, to provide a continuous indication of the presence or absence of hydrocarbons during drilling operations, thus eliminating "blind" coring and unnecessary testing. Second, to immediately furnish the industry's finest core analysis, *at no extra charge*, performed by the same crew using the same unit.

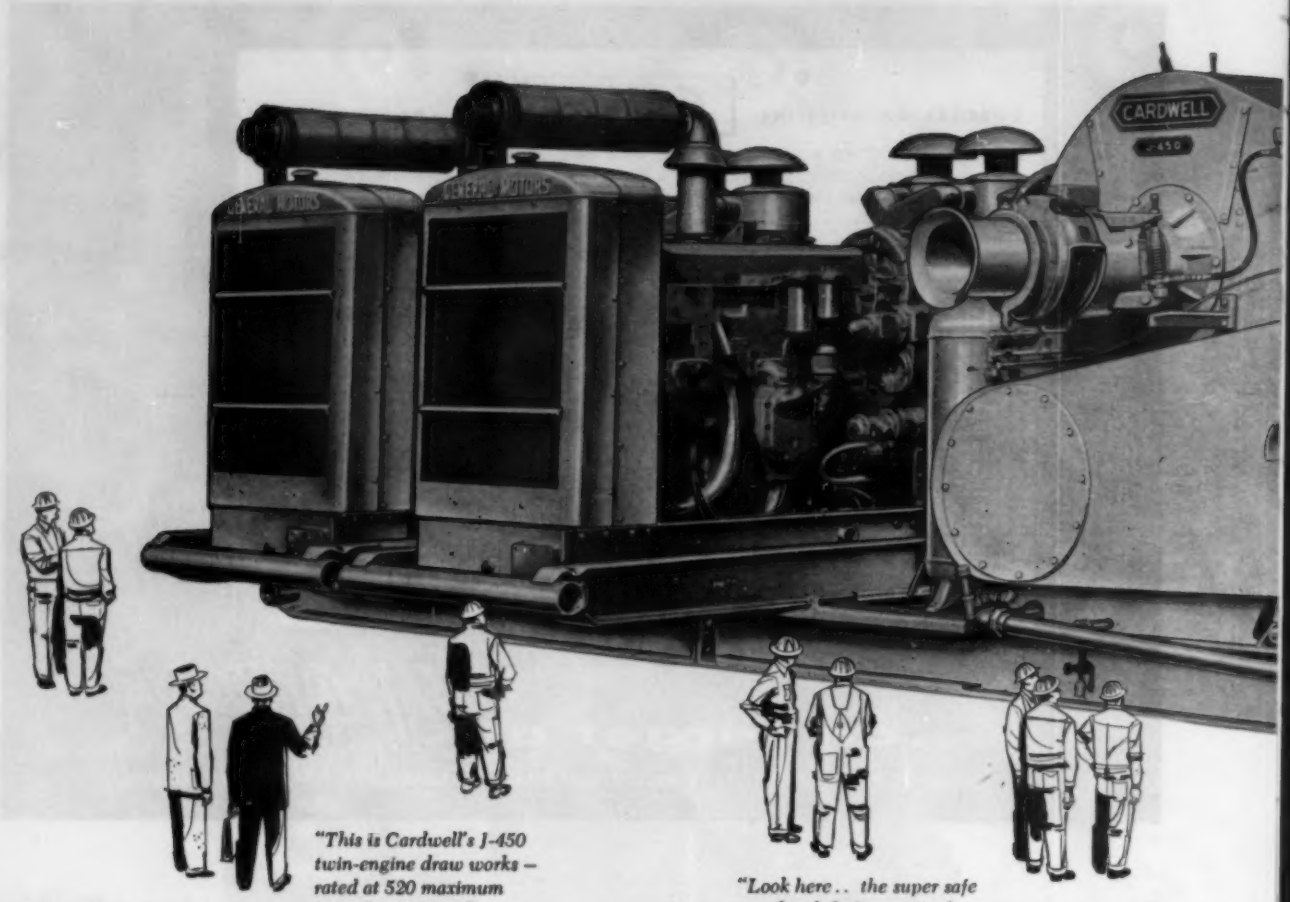
Schedule a Core Lab Well Logging unit for your next exploratory test — to "see" each foot drilled, economically coordinate drilling-coring operations, pin-point stray pays, pick proper coring points at major objectives, and to plan completions with accurate, *measured* data.

Core Lab's Well Logging Service provides skid-mounted units for platform operations and mobile trailer-type units for land locations — both equipped with facilities for complete On-Location Core Analysis.

CORE LABORATORIES, INC.
801 CORE STREET, DALLAS, TEXAS

CORE LAB
PETROLEUM RESERVOIR ENGINEERING

DALLAS, HOUSTON, CORPUS CHRISTI, MIDLAND, ABILENE, SAN ANTONIO, TYLER, LIBERAL, FT. WORTH, WICHITA FALLS, KIMBALL, OKLA. CITY, TULSA, ARDMORE, BARTLESVILLE, PAMPA, ARK. CITY, GT. BEND, NEW ORLEANS, SHREVEPORT, HATTIESBURG, LAFAYETTE, DENVER, BAKERSFIELD, CASPER, BILLINGS, WORLAND, STERLING, EL DORADO, LUBBOCK, FARMINGTON, LOVINGTON, MONAHANS, SAN ANGELO, CALGARY, EDMONTON, REGINA, VENEZUELA, S. A.

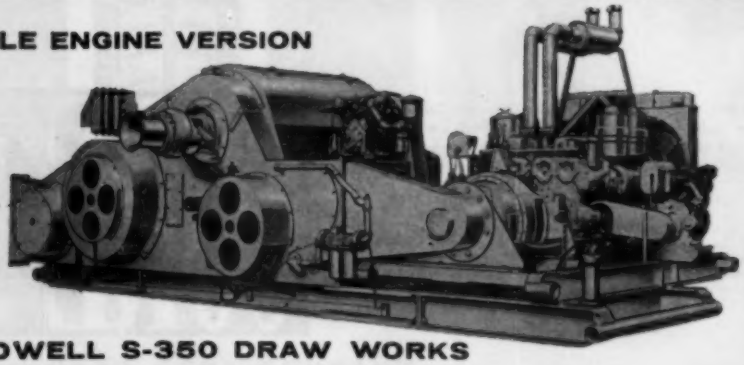


"This is Cardwell's J-450 twin-engine draw works – rated at 520 maximum input horsepower."

"Look here . . the super safe cathead shaft permits slow speeds without idling engines or shifting gears."

. . "the BIGGEST value in

SINGLE ENGINE VERSION

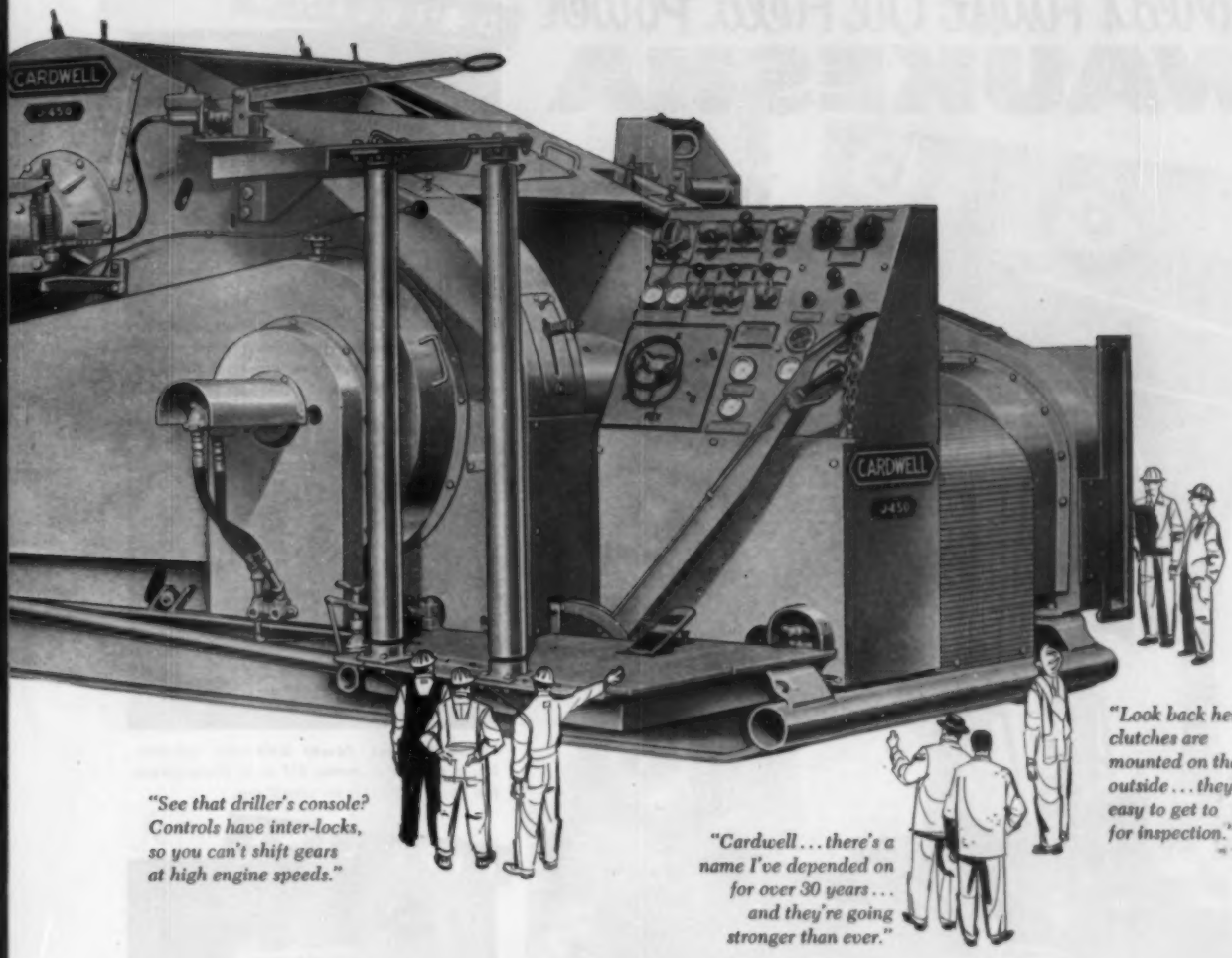


CARDWELL S-350 DRAW WORKS

Features of S-350

- Torque Converter Driven.
- Air Friction Clutch Drive for Main Drum and Cathead Shaft.
- Serves as split rig, if desired.
- Hoist portion identical to Model J-450, and will receive same accessories.
- Maximum Input Horsepower 520.

CARDWELL



"See that driller's console? Controls have inter-locks, so you can't shift gears at high engine speeds."

"Cardwell... there's a name I've depended on for over 30 years... and they're going stronger than ever."

"Look back here... clutches are mounted on the outside... they're easy to get to for inspection."

DRILLING RIGS today!"

It's a tool pusher's dream... and an owner's delight! Your men will like Cardwell's J-450 because of its fast, efficient operation. You will like it because it reduces drilling costs! The advanced engineering in Cardwell's J-450 twin-engine draw works provides you with maximum flexibility and maximum adaptability to barge, trailer, or skid operation.

– And, Cardwell's rigidly exact quality control – the result of more than 30 years' experience – protects your investment, and reduces costly downtime – for years to come. We invite you to "call on Cardwell."

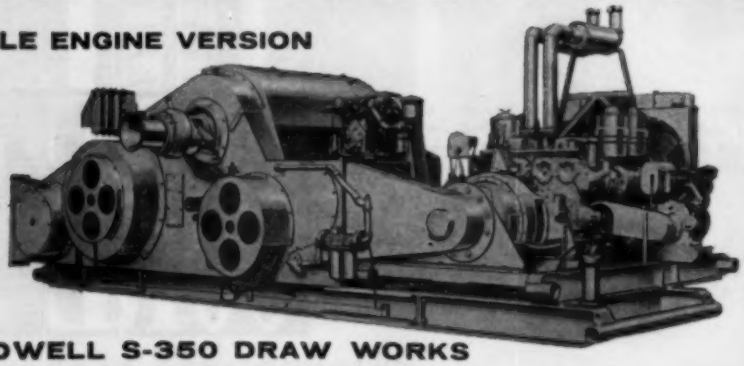
CARDWELL MANUFACTURING COMPANY • Box 2001, Wichita, Kansas, U. S. A.

"This is Cardwell's J-450 twin-engine draw works – rated at 520 maximum input horsepower."

"Look here . . the super safe cathead shaft permits slow speeds without idling engines or shifting gears."

. . "the BIGGEST value in

SINGLE ENGINE VERSION



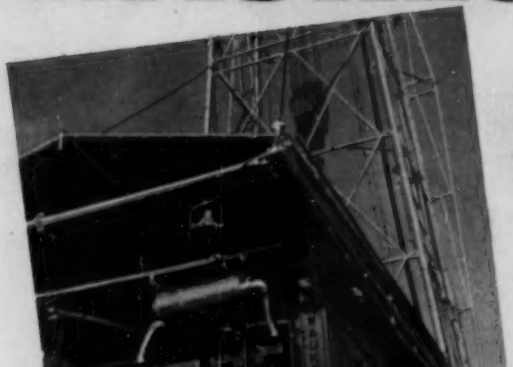
CARDWELL S-350 DRAW WORKS

Features of S-350

- Torque Converter Driven.
- Air Friction Clutch Drive for Main Drum and Cathead Shaft.
- Serves as split rig, if desired.
- Hoist portion identical to Model J-450, and will receive same accessories.
- Maximum Input Horsepower 520.

CARDWELL

World's Finest Oil Field Power
WAUKESHA

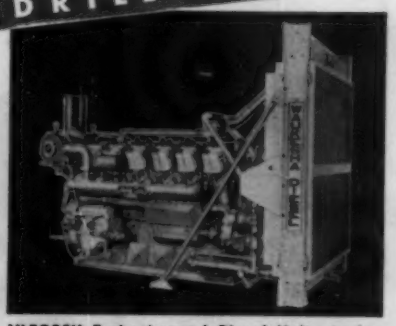


ENGINES and POWER UNITS 10 hp. to 1135 hp.

Send for **BULLETIN 1079**

50th ANNIVERSARY

DRILLING



VLRDBSU Turbocharged Diesel Unit—twelve cyl., 8½-in. bore x 8½-in. stroke, 5788 cu. in. displacement, 1100 hp at 1200 rpm, maximum.

PUMPING

"See that driller's console? Controls have inter-locks, so you can't shift gears at high engine speeds."

"Cardwell... there's a name I've depended on for over 30 years... and they're going stronger than ever."

"Look back here... clutches are mounted on the outside... they're easy to get to for inspection."

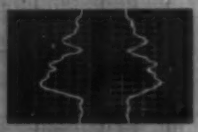
DRILLING RIGS today!"

It's a tool pusher's dream...and an owner's delight! Your men will like Cardwell's J-450 because of its fast, efficient operation. You will like it because it reduces drilling costs! The advanced engineering in Cardwell's J-450 twin-engine draw works provides you with maximum flexibility and maximum adaptability to barge, trailer, or skid operation.

– And, Cardwell's rigidly exact quality control – the result of more than 30 years' experience – protects your investment, and reduces costly downtime – for years to come. We invite you to "call on Cardwell."

CARDWELL MANUFACTURING COMPANY • Box 2001, Wichita, Kansas, U. S. A.

logging



Gammatron — Western's accuracy-proven radioactivity well logging. Simultaneous or separate Gamma Ray and Neutron Curves and Radioactive Tracer surveys. Depth measurements constantly calibrated in Western's own deep test well.

perforating

Western's exclusive Rocket Jet Perforating rewards you with greater entry hole size, greater penetration, greater excavation — premium perforating at standard prices.

fracturing

Western's great gray "Frac Fleet" offers you certified efficiency for lower cost per hydraulic h.p. — coupled with a wide range of frac fluids engineered to your completion problem.

acidizing

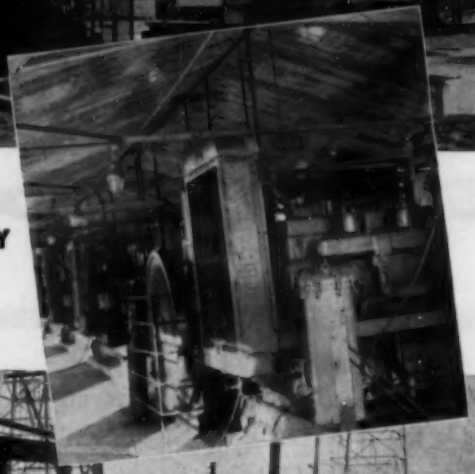
Western's full line of inhibited acids meet all conditions. The result is advanced acidizing

World's Finest Oil Field Power
WAUKESHA

ENGINES and POWER UNITS 10 hp. to 1135 hp.

Send for **BULLETIN 1079**

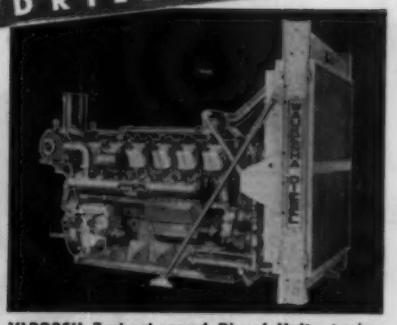
50th ANNIVERSARY Waukesha Motor 1906-1956



WAUKESHA MOTOR COMPANY
WAUKESHA, WISCONSIN
New York • Tulsa
Los Angeles

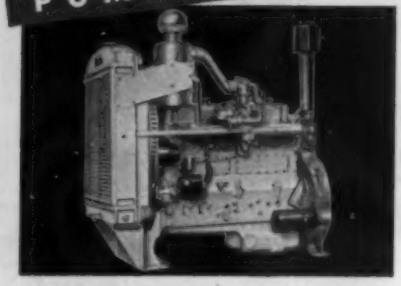
253-R-1

DRILLING



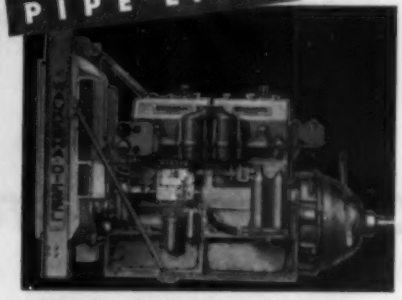
VLRDBSU Turbocharged Diesel Unit—twelve cyl., 8½-in. bore x 8½-in. stroke, 5788 cu. in. displacement, 1100 hp at 1200 rpm, maximum.

PUMPING



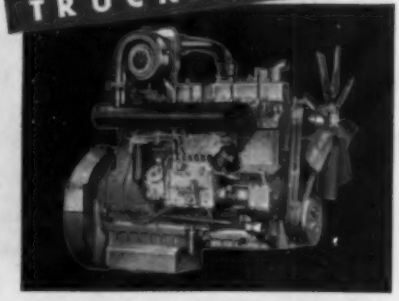
145-GZBU Gas Power Unit—six cylinders, 5⅜-in. bore x 6-in. stroke, 817 cu. in. displacement, 176 hp at 2000 rpm on natural gas.

PIPE LINE



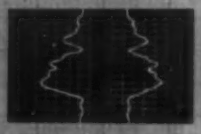
NKDBU Normal Diesel Power Unit—six cylinders, 7-in. bore x 8¼-in. stroke, 1905 cu. in. displacement, 274 hp at 1200 rpm, maximum.

TRUCKING



148-DKBS Turbocharged Truck Diesel—six cylinders, 5¼-in. bore x 6-in. stroke, 779 cu. in. displacement, 280 hp at 2100 rpm.

logging



Gammatron — Western's accuracy-proven radioactivity well logging. Simultaneous or separate Gamma Ray and Neutron Curves and Radioactive Tracer surveys. Depth measurements constantly calibrated in Western's own deep test well.

perforating

Western's exclusive Rocket Jet Perforating rewards you with greater entry hole size, greater penetration, greater excavation — premium perforating at standard prices.

fracturing

Western's great gray "Frac Fleet" offers you certified efficiency for lower cost per hydraulic h.p. — coupled with a wide range of frac fluids engineered to your completion problem.

acidizing

Western's full line of inhibited acids meet all conditions. The result is advanced acidizing treatments controlled to meet the needs of each individual well.

for these engineered well services

WESTERN Engineered WELL SERVICES

GO WESTERN

Western engineers bring to each job a vast store of experience, know-how and equipment. Backed by a never-ending program of research, this integrated group of *Western-engineered* well services constantly solves today's completion problems.

Next time, call your nearest Western Company station or office.

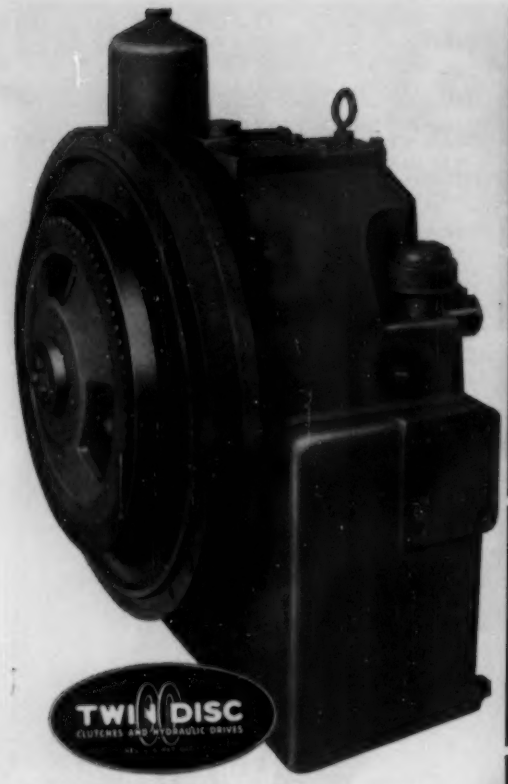
For your well's future — *GO WESTERN!*

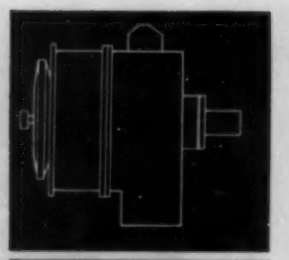
engineered well services

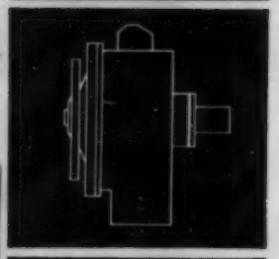
THE WESTERN COMPANY

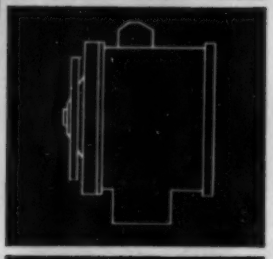
general offices: Midland, Texas

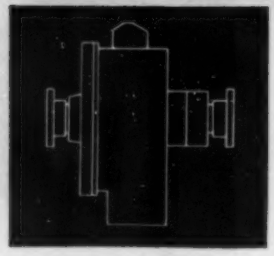
Texas: Odessa, Seagraves, Levelland, Snyder, Lubbock, Borger / **Oklahoma:** Lindsay, Healdton, Okla. City / **New Mexico:** Hobbs / **Kansas:** Ulysses, Liberal.











announces new *SINGLE-STAGE* Torque Converters

Here's another good answer to power transmission problems in the oil fields — the all new Twin Disc *Single-Stage* Torque Converter.

This new single-stage torque converter is currently available in the 1500 Series, which is applicable to engines producing from 30 hp at 1150 rpm to 207 hp at 2500 rpm. Four models provide various input and output combinations.

Already time-proved by extensive field tests, this single-stage torque converter is ideal for truck-mounted rigs and a host of other applications . . . in all types of oil field equipment requiring smooth, efficient, dependable torque multiplication.

This new Twin Disc Torque Converter cuts operating costs . . . boosts profits . . . handles the toughest jobs with ease. The converter's smooth flow of power eliminates sudden load shocks between engine and driven equipment . . . cushions out harmful vibrations.

Specify a Twin Disc Torque Converter in your next piece of powered equipment for oil field application.

TWIN DISC
TWIN DISC
Torque Converters

Fluid drives solve power transmission problems

To solve power transmission problems that *cut work output* and *raise costly downtime* on oil field equipment—an ever increasing number of manufacturers *and* users specify various types of fluid drives.

Today, there are several types of these drives available, including fluid couplings, and single-stage or three-stage torque converters.

The fluid coupling is most widely used on equipment not requiring torque multiplication, but needing the shock cushioning characteristics of *fluid*.

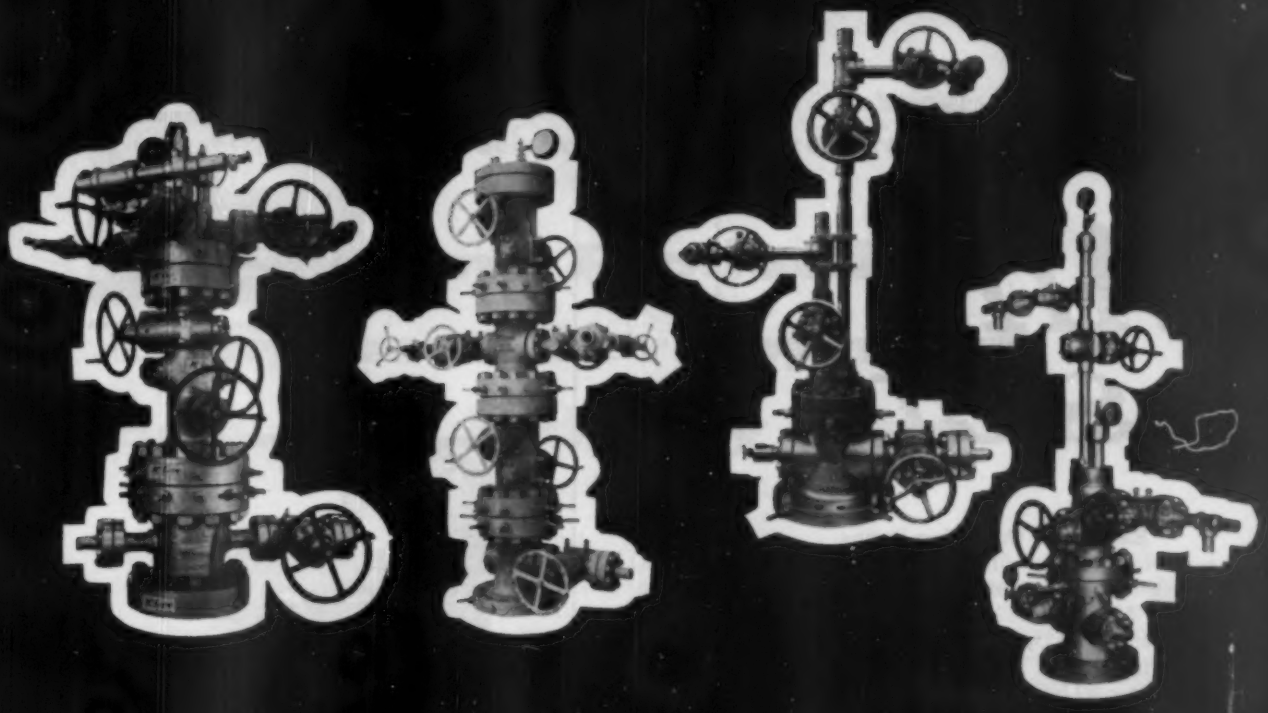
The single-stage torque converter is found most frequently where oil field equipment needs only *mild* torque multiplication. Possibly a simple fluid coupling has been used in the past, so installation of a single-stage torque converter can "modernize" machinery without a complete redesign.

The three-stage torque converter —with multiplication up to 6:1—is usually found when it is desired to maintain nearly governed engine speed—with maximum power output over a wide range—and to produce high torque ratios for hoisting or heavily loaded vehicles.

Whatever the equipment, whatever the application, the Twin Disc Clutch Company offers the only *complete* line of industrial fluid drives available for dependably transmitting power to driven equipment. Fluid couplings are provided in a variety of models for engines and motors from ¾ to 850 hp . . . and torque converters, both single-stage *and* three-stage, are available for engines from 30 to 1000 hp.

If *you* have a power transmission problem, and if you feel that a fluid drive will help solve it, *consult* Twin Disc Specialists for unbiased recommendations as to which drive is best suited to your particular operation.

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois
Branches or Sales Engineering Offices: Cleveland • Dallas • Detroit • Los Angeles • Newark • New Orleans • Tulsa



THERE'S A McEvoy CHRISTMAS TREE FOR ANY FORMATION, DEPTH OR PRESSURE— SINGLE, DUAL OR TRIPLE COMPLETION

For any combination of pressures, combination of formations, or combination of depths, McEvoy Company manufactures a Christmas Tree that will give safe, economical, trouble-free completion. From the simplest screwed end, low pressure Christmas Tree assembly to high pressure, multiple completion, stainless steel Christmas Trees, McEvoy has the answer.

McEvoy trees are successfully servicing all types of completion problems. They include:

Single completions, both low and high pressures.

Dual completions, with low pressures on both strings.

Dual completions with low pressure on one string and high pressure on the other.

Dual completions from medium pressures to highest pressures.

McEvoy has the answer, allowing in many instances production in several sands in one well with each string operating independently of the other — truly, an amazing economical benefit to oil producers today.

McEvoy COMPANY

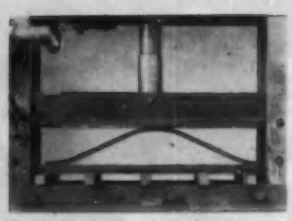
OIL WELL EQUIPMENT

TEXAS AND MILBY ST. • P. O. BOX 3127 HOUSTON 1, TEXAS

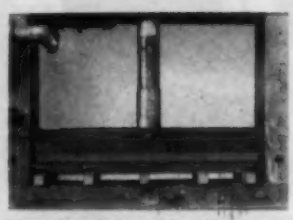
"All set"

Each Baker Centralizer Spring is carefully formed with a bowed height that is greater than it should be for its length . . . in accordance with Baker's original Optimum Centralizer Spring Design. The spring is then *pre-set* by being completely flattened in a press and allowed to return to the exact bowed height specified by the Optimum Spring Design. Since this specified bowed height of the springs will not thereafter be materially lessened due to permanent set . . . even when the centralizer passes through tight spots or dog-legs in the hole—the *net effective reach* to center the casing is present when cementing is started. You are *all set* for best results.

BAKER OIL TOOLS, INC. HOUSTON • LOS ANGELES • NEW YORK

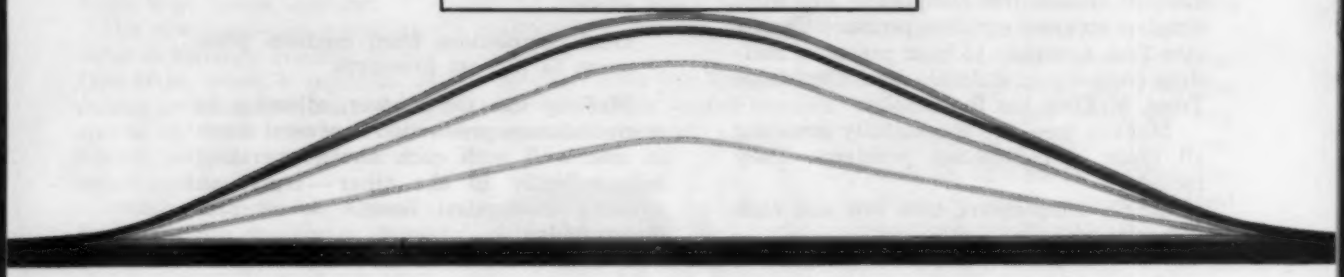


Spring in position in hydraulic press for flattening test.



The tightest hole could not flatten any spring more than this.

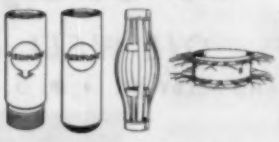
The specified bowed height (reach) must be present after the slight permanent set.



Baker
Model "H" HINGE-LOK
Casing Centralizer
Product No. 9112

Baker
Model "G" SLIP-ON
Casing Centralizer
Product No. 910-G

Ask about Baker "Protective" Cementing



Baker Flexiflow Fill-Up Collars and Shoes
Baker Casing Centralizers
Baker Wall Scratchers

BAKER
CASING CENTRALIZERS

New ideas, materials and techniques incorporated in late models reflect rapid pace in research and development

Drilling and Production Equipment Development Sets Fast Industry Pace

HOW much farther can we go in development of new drilling and production equipment? Judging by the accelerated pace set by manufacturers and service companies in the past year, the horizon is virtually unlimited. While it may be somewhat a truism that there is very little new under the sun, even a quick glance at new product developments in the recent past is sufficient to convince even the pessimist that tremendous strides have been made toward profitable improvements.

In 1955 the U.S. oil industry drilled between 56-57,000 wells, a new record by several thousands. Wells are getting deeper. The record now stands at 22,570 ft; in 1945, it was only 16,600 ft. Average depth of wells drilled last year was about 4100 ft; just five years before this it was 3700 ft. These rather phenomenal achievements could not have been possible without significant improvements and developments in equipment employed to accomplish them.

An unusually high demand for petroleum and its products since the end of World War II, and particularly in the past several years, has been a driving force behind the technological progress made in drilling and producing equipment and methods. The industry has been favored with a high volume of activity, necessitating accelerated use and application of products. Accordingly, costs of most essential items went up along with demand. The motivating drive to keep costs down in view of rising labor and material costs has accounted for numerous outstanding equipment items.

Drilling Equipment

Drilling Rates. Very closely coupled with new equipment are new methods and techniques. It would be difficult to state which comes first. It is of interest to note that although equipment and services and labor cost more now than ever before, drilling costs have been maintained at a constant low level. The obvious answer here is faster penetration. Faster rates of penetration were achieved through the efficient use of better tools and methods . . . air and gas drilling, for example. But, even penetration rates have levelled off in the last year, and cost reductions were attained through such methods as the efficient application of slim-hole drilling.

But, these two drilling methods are not new. On the contrary, they have been known for many years. They have come into prominence primarily because of new equipment developments that could meet the requirements of these profitable ideas. When air and gas drilling first came into vogue, it was common practice to couple as many as nine individual compressors together to supply the needed volumes. The trend today is toward especially designed and fabricated compressors for this type service. Considerable improvements have been made in circulating heads used in conjunction with this drilling idea. And, continued improvements in equipment hold much in promise for air and gas drilling. Not only is the compressor function under continual investigation, but research has been directed toward satisfactory shut-off of water zones that has impeded drilling progress in some areas by this technique.

Flexible power. The rotary drilling rig is undergoing many changes beneath the surface that may not be obvious at first sight. One of the notable changes that at one time was not widely popular is the use of electric power. Unique developments in power generation, its flexibility of control and application is finding wider use in new rigs. Automatic controls, not long ago in the field research stage, are fast becoming "standard" equipment.

Rig layouts. Considerable progress has been made in rig layouts to further speed up moves and to save space. Drawworks are located beneath the derrick floor thereby reducing the substructure size and providing maximum utility of available floor space. This is particularly attractive on offshore structures where deck space is at a premium.

Although no radically new equipment appeared on the drilling scene in the past year, many new models of practically all major equipment items were announced. In each case, improvements in design, metallurgy and efficiency characterized the new product rather than something revolutionary. Not to be overlooked is the enormous amount of effort and money now being devoted to find a better way of making a hole in the earth. In the meantime, better and more efficient equipment comes out of the research departments to help keep drilling costs down.

Slim hole drilling has come in for extensive field use and evaluation. In a number of areas, such as the Rocky Mountains in particular, this technique has resulted in tremendous savings. The noticeable trend appears to be toward the proper selection of equipment for the particular job in order to obtain maximum benefits from slim hole drilling.

Although no revolutionary bit developments were announced recently, there has been continued and a concentrated improvement program especially directed toward metallurgy. Bit life in the smaller sizes used in slim hole work depends largely upon bearing life. In small sizes, bearings play a significant role. The jet bit is under constant investigation to evaluate its performance under certain drilling conditions. These studies would further

point to greater efficiencies in the application of jet bits. Along with this, of course, has been more emphasis on bit hydraulics.

Mud pumps, which now take on added importance in drilling economics as a direct result of the relation of hydraulics to penetration, also saw some new ideas placed on the market. Although the mud pump principle remains essentially the same, drastic changes were made in design. For the first time, multiple roller chains were employed. Hydraulics and mechanics of mud pump valve action contributed the key to several notable improvements which step up pump efficiency.

Although the progress curve on new drilling fluids has approached a leveling off, still new products come out of research. Special systems were developed for unusual conditions . . . high pressure and temperature. New plugging agents and lost circulation materials made their appearance, as well as several additives to improve the quality of drilling fluids.

Oil Well Cements

Two radically new oil well cements were introduced in the past year. Both varied from the portland cement types. The slurry of one new cement is made of three materials: 35 per cent inhibited phosphoric acid, a powdered aluminous material containing a viscosity control agent and a powdered fluoride material which acts as an accelerator or setting-time-agent. Another new cementing material incorporates one of the oldest building materials known: pozzolan. This gray powdered pozzolan is combined with hydrated lime, water and a chemical activator. Its first use was in wells with bottom-hole temperatures of 140 F. and higher, and research continues to broaden its application.

Completion Methods

The trend in completion technics and equipment is definitely toward dual or triple completion where multiple zones are available. The tremendous development in this field has been accelerated in the post war years due to improvements in equipment, the deeper drilling, high well costs and the introduction of the multiple tubing type completion. Now over 200 wells have been completed with the latter method. In 1955, the introduction of improved dual bore trees and packers and the adaptation of gas lift valves and pumping systems to this application has enhanced the advantages inherent in this type completion. Advantages that have been achieved are better well control, improved artificial lift for both zones, protection of casing. Also, it offers a more versatile completion arrangement.

Perhaps the most important development in this field was the introduction of the independent running technique. This method enables us to use conventional well completion or service equipment and eliminates the need of special dual bore elevators, spiders and other equipment and eliminates running time previously required for clamping.

Operators have indicated that no extra drag is encountered in running the second strings past the first strings. Undoubtedly this technique will become more or less standard practice in the field where the particular advantages of the multiple tubing string are desirable.

Permanent Completion

Permanent completion technics have been further developed to permit their use in dual completions — both conventional and multiple tubing types. Also, strides were made to permit the use of this valuable method in slim hole completion. Certain refinements were added — the most notable was the development of a unitized truck capable of performing wireline work, pumping and squeeze cementing. Smaller tools plus improvements in logging tools have added to the flexibility of this method of operation. Of key importance is the development of a removable extension between upper and lower packer or tubing to prevent communication between zones.

The next logical step will be offshore where major well service costs are encountered in setting up the rig or pulling unit. The first step may be a floating service boat capable of performing all permanent completion functions. The next may be a method of working several wells from a central platform either through crown extensions or possibly through flow lines.

High Pressure

The problem of handling high pressure wells now faces many in production. 1955 saw the first major steps taken to control wells in the 10,000 to 15,000 psi class. This problem has divided itself into two major phases — one, method of completion to provide the greatest well control and two, the development of equipment and materials to handle the high pressure involved. Also, high temperatures effect operations.

In the past year aluminate, resin, pozzolan, plastic, and other cements were introduced to solve the cementing and squeeze problem at high temperatures.

High strength P-110 tubing and many special high pressure joints were introduced. Also, heavy wall tubing is being used.

High pressure casing — employing heavy walls or ultra high strength steel has now been developed. 15,000 psi Christmas trees utilizing many new and revolutionary seals were placed on the market.

With available equipment, the type completion considered most promising at this time is to hang the tubing open ended just above the producing interval. In this manner, maximum control is provided on the well and the casing is protected since production is through the tubing.

Very few high pressure completions have been made to test out our equipment or methods. One ultimate test is being watched — the Richardson and Bass well now being tested south of New Orleans.

Surface pressures anticipated are slightly in excess of 15,000 psi.

Fracturing

In recent months, fracturing has hit its stride here on the Gulf Coast — exploding a previous theory that fracturing would be useful only with hard formations. Strong progress has been made in the improvement of service equipment and methods and in frac fluids.

To show the rapid developments that have taken place, two illustrations are made. First, a 75,000 gal fracture treatment in the Headlee field, and the second was during the tenth 75,000 gal treatment made in the field. In the first, a tremendous amount of equipment was assembled for this job. The time elapsed is only about eight months, but a considerable reduction in equipment and the improved layout has been noted. The amount of hydraulic horsepower available for the treatment was approximately the same in these two jobs. Improved high pressure-high volume equipment plus improved fracture techniques is largely responsible for this. The result is a noticeable reduction in costs.

A typical job in this field, uses 4940 hydraulic horsepower and an injection rate of 28.4 bbl per minute.

With the success of high volume treatments, 100,000 bbl fracture treatments have been proposed for many wells in the West Texas area.

Several new materials have been used. One being river water in the San Juan Basin and was most successful. Another improvement has been the introduction of pump trucks specifically designed for fracture work. The results are considerably improved over our previous use or adaptation of cementing equipment. One unit recently introduced features high pressure plus high volume. Powered by an aircraft engine, the unit is remotely controlled providing better coordina-

tion of operations during the treatments.

In sand control, plastic coated walnut shells have been introduced. Used like cement, the mixture is squeezed into the formation, allowed to set, and drilled. The result is a hard, permeable screen behind the casing and in perforations. Only time will tell its ultimate acceptance. It is a step in the right direction in that it is easier to use than sand consolidation methods and eliminates the additional iron in the hole required by other screening methods.

Increasing depths are again responsible for several new developments in the artificial lift field. These are the long stroke pumping units (possibly four new models introduced last year) increasing adaptability of hydraulic subsurface pumping units, and the introduction plunger lift.

The long stroke unit might be called the extension of the beam radius by hydraulics. Progress in hydraulic pumping at this time consists primarily of extending the usability of the present technique.

Plunger lift in deeper wells eliminates the high gas slippage encountered in intermitter operations from low fluid levels. Ball pump is in effect a similar device — balls serving same purpose of acting as barrier to gas-fluid slippage.

The plunger-lift is basically a free piston that operates within the tubing string. It is equipped with an internal-automatic valve which opens on reaching the surface to allow the plunger to return to the bottom of the string. It closes on reaching the bottom stop. Gas pressure drives the piston and crude above the piston to the surface.

Around the corner, lies a liquid plunger lift to supplement our mechanical techniques. A high surface tension agent will ultimately be used. This will prevent gas slippage in our complex well completions.

One of the most fascinating areas of progress in the oil patch is the rapid move toward automation. Starting some 10 years behind our brethren in the refineries and 4 years behind pipe lines, our slow start is due to our unusual problems and our diversified fields. Solution of these problems will result in the widespread use of automatic control in production.

This year is notable in that commercial automatic lease production installations were made by a large number of operators and more are on the board. Automatic lease custody transfer made its debut in the Bloomer pool in Kansas. In December of last year, this unit was placed in operation by Gulf Oil Corporation in cooperation with the Kaw Pipeline Company.

R. L. Greer and D. C. Meyers of Shell Oil Company presented a paper before the API in Fort Worth recently entitled "Automatic Lease Production, Wasson Field, Texas." One of the most important items brought up in this paper was a recent study of the time pumpers or switchers spend on various tasks. The breakdown of production operations were as follows:

22 per cent of the time spent in operating the tank battery
18 per cent of time was necessary to produce wells
15 per cent necessary to run oil to pipe line
10 per cent maintaining lease records
25 per cent performing well tests
10 per cent miscellaneous activities.

The results of this study provide a valuable clue to the time consuming functions which can be eliminated by automatic equipment.

A wide variety of control valves, timers and operating devices has been made available.

More recently, a package type well testing system has been placed in operation. Units select the wells to be tested based on a time cycle — diverting flow of the well from the main flow line through the testing unit. Unit is equipped with a separator and devices to measure gas, water and oil. Water and oil are measured by dump meters which automatically fill and dump the liquids in unit increments. Measures are provided by recording the number of dumps made in the test period.

The gas flow is measured by an orifice meter which automatically integrates, corrects and totals the standard volume of gas flowing through the unit. The device measures static and differential pressures and from this data calculates electronically the flow rate in standard cubic feet of gas. Additional electronic integrating units total the flow of gas.

In addition, where it is required, electronic water cut instruments or water content measuring devices are available for use in testing units. This device is similar to that used in BS & W content monitors used in custody transfer systems.

Lease Custody Transfer

While the foregoing methods are designed to reduce switch operators time and in some ways refine the lease operation, automatic lease custody operations have three advantages:

1. Reduced switcher time for oil runs — some 15 per cent of the switchers time.

2. Reduced time and supervisory activities on the part of the pipe line company to witness runs.

3. Since oil may be run continuously, equipment will reduce lease and field tankage requirements. Thereby reduce investments in tank batteries, reduced maintenance requirements and eliminating the vapor loss problem.

The automatic lease custody installations used to date both experimental and commercial have these features in common:

1. Measurement of oil is made in a special tank of calibrated volume in which high and low level switches result in filling and draining the tanks.

2. Tanks are equipped with high level and low level weirs and back drains to assure accuracy in measurements obtained with switches or let's say a fail safe method.

3. Valves are interlocked to prevent filling tanks while running to pipe line and,

4. Then oil temperature, gravity BS & W content, and sampling are made just prior to the oil runs.

5. Where BS&W exceeds that acceptable to pipe line — oil is returned to the heater treater or settling tanks for further treatment. In actuality, BS&W is monitored prior to entering the measuring tank where it is returned or accepted by the monitor. A second monitor is made as the oil is run from the measuring tank to the pipe line.

Remote Controls

Another step in automatic controls is the remote control system. While used to some degree in the operation of isolated and offshore leases, the development of complete commercial systems has been completed in recent months.

While a number of systems have been used, one is unique in that signals may be transmitted over phone lines or power lines or where required, over radio. The advantage of this is that the control point can be as far away from the operating area as desired. Also, it may be adapted to the various terrain requirements.

This system provides a complete line of electrically operated Christmas tree controls, automatic tank switching gear, pressure and temperature transducers, devices for transmitting other pertinent production information, and a method of selecting the point to be controlled at any time. With this unit you could sit in Houston and audit the operations in the field, control wells or entire leases, and talk to personnel in the field.

If space would permit, there are many other trends and new developments which have contributed to this industry's progress in the past year that could be included. Tomorrow, operations will be effected and highlighted by more dual completions, deeper wells, higher pressures, need for greater economy, automation in the field and renewed interest in secondary recovery methods. ★ ★ ★

They Use to Blow Their Tops – i i i

Seals on floating roof tanks have been developing for three-quarters of a century. Today, modern sealing mechanisms are effective in retarding fires, smog, and vapor loss.

Phillip E. Rose*

WHEN a lightning-struck oil tank burst and spewed its flaming contents toward the fire-susceptible equipment of Acme Oil Company's Titusville plant, the hours of that pioneer petroleum refinery were numbered. The resulting pyrotechnical display lit up the sky above the Pennsylvania town during a weekend of blazing days and bright nights.

After echoes from the final explosions had died away, and the last remnant of combustible fluid had been consumed, embers of crumpled ruins in and around the refinery gave added evidence to the fact that the American petroleum industry had just suffered its first great industrial disaster.

The date was June 14, 1880.

Acme abandoned its plant site in despair, but those who believed that Pennsylvania and oil progress were irrevocably linked continued on undaunted. For example, there was William Birge of Franklin, situated on the Allegheny less than 20 miles beyond Titusville.

On September 11, 1880, just three months after the beginning of the Titusville tragedy, Birge revealed his ideas on petroleum storage safety to the U. S. Patent Office, as follows:

> "It is often the case that oil tanks are struck by lightning and when lightning strikes a tank . . . the large quantity of gas stored beneath the roof is instantly ignited and exploded, the explosion either throwing the roof off from the tank or shivering it in pieces, thus exposing the oil and setting it afire. The result of such an accident is the loss of the tank itself which alone involves the loss of several thousands of dollars.
>
> "The object of my invention is to provide an oil tank . . . such . . . that the surface of oil in the tank will always be covered and protected, regardless of the quantity of oil in the tank, and no space be provided between the oil and cover for the accumulation of the escaping gases; and with these ends in view my invention consists essentially, in an oil tank . . . with a floating cover . . ."

This first application for a floating-roof tank patent was granted in November, 1880 (U.S. 234,745).

Although Birge recommended that sufficient annular area be provided between the rim of his pan-type floating roof and the tank shell to allow the float free and unrestricted vertical movement, he did not suggest any necessity for sealing the exposed oil surface in this annular space from contact with the atmosphere.

By January, 1881, in his second application, Birge attempted to rectify his previous omission with the following pronouncement to the Patent Office:

> "The floating cover . . . is of smaller diameter than the tank, and is formed with . . . guides . . . which come against the inside of the tank and make the annular space between the outside of the cover and the tank of equal width all around the cover. To protect this space from rain and fire, I provide a sort of portable cover . . . which is made up of sections, each section . . . made by taking a piece of sheet metal, say, six feet in length and one foot in width, and cutting it to about the same circle as the tank, and fasten . . . legs to it . . . to fit over the edge of the tank. These sections when in place on the tank form the continuous cover over the space which protects the oil from rain, and in case the gas which may collect in the space under this cover should take fire the explosion which would follow would lift up the sections, but they would suddenly fall back to place . . . and thus smother the flames and save the oil from burning."

These words were important in U. S. Patent 239,431. (Fig. 1)

During the period between Birge's

*Research Engineer, Graver Tank & Manufacturing Company, Inc., East Chicago, Indiana.

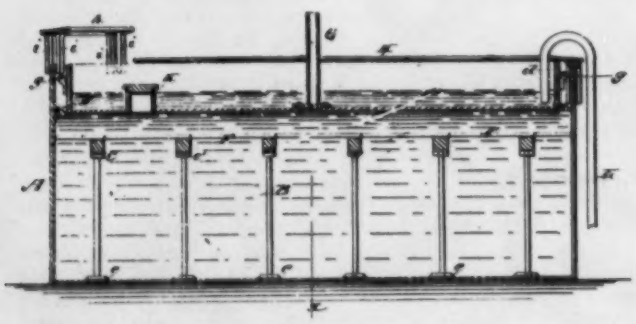


FIG. 1. Birge's Afterthought. A floating roof seal (H) consisting of individual portable sections (h) with legs (i) to protect the annular space. The floating roof (D) is centered by guide units (g).

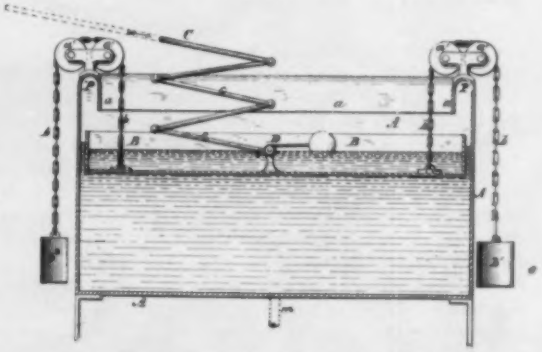


FIG. 2. King's Floating Pond. When (and if) the water surface in floating pan (B) contacts drooping flange (a), the seal is accomplished.

FIG. 3. Reinecke's Concealed Pusher. In a roof composed of individual floating compartments (A), horizontal spring pushers (E) press and seal the peripheral floating segments tight against the tank shell. Overhead, horizontal wing seals (D) prevent exposure of the gaps between the compartments.

first and second application, George King devised a floating-roof tank whose annular space was shielded from the atmosphere by means of a liquid (water) seal. (Fig. 2) The deck of his pan-type floating roof was purposely burdened with water to a depth of about 12 in. The other component of the seal was a peripheral flange that curved inwardly and downwardly from the top of the tank shell toward the floating pan.

In his patent (U. S. 234,291), King described the sealing mechanism thusly: "When fire has already attacked the petroleum beneath the pan . . . the petroleum will expand and carry the pan upward until the water in the pan receives the flange and the formation of the seal is accomplished."

King has the honor of being the first to point out the utility of floating-roof tanks from the standpoint of oil evaporation loss reduction; and, although he filed his *application* subsequent to Birge's, King received the initial floating-roof *patent*.

In comparatively rapid succession, three more floating-roof applications descended on the Patent Office between 1881 and 1884: August Newell of Bradford, Pennsylvania, invented the double-deck floater (U. S. 244,649); King proposed minor improvements on his previous patent (U. S. 251,245); John Reinecke of Pittsburgh conceived the ancestor of today's widely used floating-roof seal accessory — the concealed, horizontal, spring-powered pusher (U. S. 289,557). (Fig. 3.)

Two decades of the twentieth century had elapsed before the first semblance of the modern floating-roof sealing shoe was officially proposed to help close the gap between the floating-roof rim and the tank shell. Leland and Schwemlein (U. S. 1,426,997) devised shoes consisting of peripheral plates that enjoyed a pivoted position at the bottom of the floating-roof rim. (Fig. 4.) From that location, each shoe extended upwardly and outwardly through the annular space to contact the tank shell. At the contact point, the shoes curved back over the top of the deck rim. Coil springs, emanating from the deck rim, pushed against the concave, inner surface of the shoes to urge them tightly against the tank shell. The vapor-permeable joint between the shoe and the deck rim was smothered by a flexible fabric material that adhered to the surface of both members.

In that era, the contributions of western oil industry inventors were being displayed, and the demand for their efforts was gaining momentum; the gigantic, black gusher of the Spindletop Well near Beaumont, Texas, in 1901, had signaled the beginning of a major expansion of the oil industry toward the West in general, and the Mid-Continent region in particular.

From Bartlesville, Oklahoma, in 1922, J. H. Wiggins disclosed a long, smooth, vertical-seal shoe designed to operate in parallel sliding contact with the inside surface of the tank wall (U. S. 1,493,174).

The upper edge of the shoe was curved inward to facilitate vertical travel past protruding objects such as tank shell rivets and lapped plate joints. (Fig. 5.) The bottom edge was also curved inward, and, in addition, much of the lower area was submerged in the tank contents. The space between the roof rim and the shoe was shaded by a horizontally slidable seal plate projecting backward from the shoe and over the rim. To attain a high degree of flexibility, this circumferential sealing ring was formed by a number of individual shoes, standing side by side.

A combination of liquid and mechanical sealing devices closed the gaps between adjacent shoe sections. A spring-powered plunger exerted a horizontal, radial thrust outward through the deck rim to aid in holding the lower area of the long vertical shoe plate flush against the tank shell.

The fundamental theory behind the sealing effectiveness of the long, limber, vertical floating-roof shoe depends on this hypothesis; any vertical slit (caused by surface irregularities between the shoe and the shell against which it rubs) would be so narrow that atmospheric currents could not easily reach the tank contents in which the lower portion of the shoe is immersed. Furthermore, any air or oil vapor that did gain access to such a slit would tend to remain in a stagnant state, and act as a barrier between the oil surface and the wind currents of the atmosphere.

It was in the autumn of 1923 that the floating roof was figuratively subjected to the "acid test" — literally it was a fire test. The seal mechanism on the pan-type floater selected for this experiment consisted of vertical shoes, a flexible sealing fabric, spring-powered pushers and a new series of radial operators called "hangers."

The test operations involved four deliberate — but unsuccessful — attempts to destroy by fire a floating-roof tank containing gasoline.

Listed below, in the order in which they were committed, are the incendiary acts resisted by the floating roof:

1. A lighted taper was inserted be-

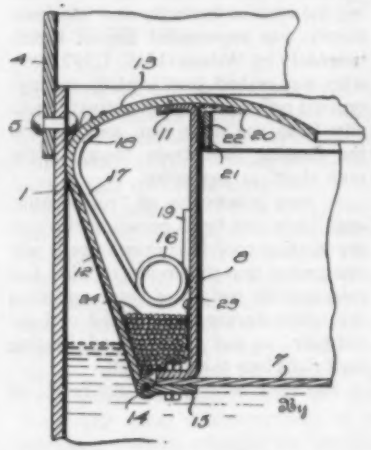


FIG. 4. The Shoes of Leland and Schwemlein. Coil springs (16) maintain the pivoted shoes (12) against tank wall (1). Extending from floating deck (7) is pivot (14), which is sealed by fabric (23). Granular material (24) is an optional, auxiliary sealing commodity.

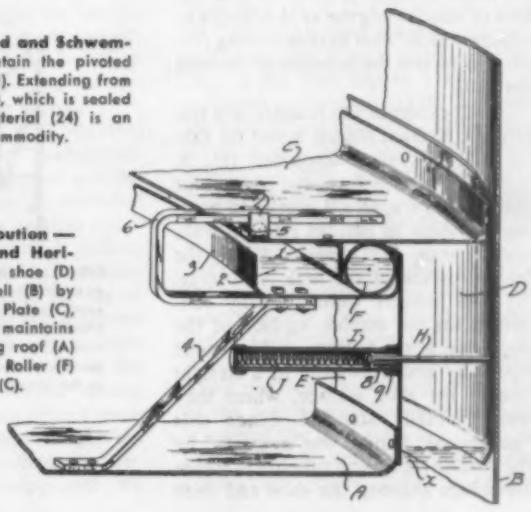


FIG. 5. A Western Contribution — Wiggin's Vertical Shoe and Horizontal Pusher. The vertical shoe (D) is pressed against tank shell (B) by spring-powered plunger (H). Plate (C), which covers the operation, maintains gas-tight contact with floating roof (A) because of liquid seal (2). Roller (F) facilitates movement of plate (C).

tween the vertical shoe and the tank shell.

2. A gasoline fire, which eventually reached a height of six feet, was started on the floating roof.
3. The shoe was wetted with gasoline. Upon ignition, this gasoline burned for two minutes.
4. A gasoline fire was started that burned for 15 min, extending over the entire deck and involving flames eight feet high.

Results of the experiment are expressed in words of the Bureau of Mines writer Ludwig Schmidt,[3] an impartial and courageous witness of the tests. He concluded that it was virtually impossible for gasoline to burn continuously in a tank properly equipped with the described floating roof, even though the vapors between the shoe and the tank shell become ignited by sparks or fire.

Schmidt's inspection of the seal mechanism revealed that each vertical shoe was supported at the top by a duet of spaced, curved "hanger" arms. Although the lower portion of each hanger arm was pivotally attached inside the rim of the floating roof, the hangers extended upward and then leaned outward over the rim to connect swingably with the shoe plates. As Schmidt saw it, "These hangers lean toward the tank so that the weight of the shoe throws it snugly against the tank shell." In his patent application of December, 1923 (U. S. 1,574,011), Wiggins stated that the purpose of bent, swinging hangers is to maintain a "parallel relationship between the shoe members and the side wall of the tank." (Fig. 6.) In addition, the hangers cause the shoes to move radially with respect to the floating deck.

To blanket the opening between the vertical planes of the shoe and the deck rim, a flexible fabric seal, consisting of wire-reinforced asbestos cloth, was connected from the top of the deck rim to the shoe. Wiggins is credited with the idea of also joining the vertical edges of adjacent shoes with flexible sealing fabric to complete the isolation of the tank contents.

A relocation of the hangers to a less obvious position hidden below the fabric seal was soon suggested (U. S. 1,574,013). As before, the purpose of the hangers was to aid gravity in holding the shoes in parallel relation with, and in snug engagement against, the inside surface of the tank shell. (Fig. 7.) The hangers were pivotally connected on the outside surface of the deck rim, at the bottom, and extended upwardly and outwardly in a straight line to the shoe surface, where they were pivotally attached. Since this "under-seal" hanger was concealed by the flexible fabric seal running at higher elevations between the shoe and deck

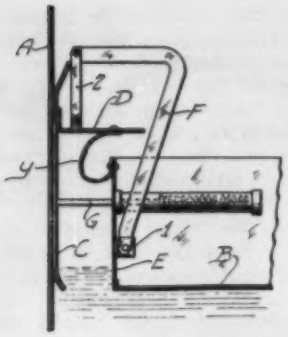


FIG. 6. A "Fire-eater" Seal Style. The vertical shoe (C) is supported by pivoted hanger (F) at the top and urged outward by pusher (G) near the bottom. Flexible fabric (y) isolates the annular space from the atmosphere.

rim, the result was a tidier appearance for the deck periphery.

The horizontal, spring-powered pushers were retained in the "under-seal mechanism" design, and their scope of usefulness enlarged to include "the maintenance of shoe members in approximate concentric relationship with the floating roof."

The latter phase implied that the horizontal pusher could aid in centering the roof in the tank, and this same theory was expounded almost simultaneously by Wilson (U. S. 1,597,399), who suggested horizontal, spring-pressed rollers that push outward radially from the deck rim, and prevent the floating roof from "hugging the tank shell" at any point.

A long procession of "roof-centering" ideas has been parading through the floating-roof field ever since it was recognized that the impact of wind and rain and the weight of snow and sleet are often working, combined or individually, to sail the exposed floating roof right into the tank shell.

The view beneath the seal fabric of many modern floating decks will reveal "centering" devices consisting of weighted deck hands that exert an increasing counter-reactive pushing-away pressure against the tank shell as the floating roof approaches it.

Design of these units is based on ideas somewhat similar to those disclosed by a fleet of U. S. inventors in the wake of Gallagher (U. S. 1,665,-163) and Johnson (U. S. 1,758,225). (Fig. 8.)

In 1926, they recommended the installation of peripheral pushing shoes that contact the tank shell and can swing about a fulcrum located at the top of the floating-roof rim. Counterweighted lever arms, which extend radially inward over the roof from the pivot point, are first-mates for the shoes.

Johnson, who utilized polygon-shaped shoes, described the function of his mechanical crew thusly: " . . . If the edge of the roof should approach unduly toward the tank at any particular point, then the lever arm of the weight will increase so as to give the weight an increased leverage in forcing the shoe out to its normal position."

In behalf of his curved-plate pushing shoes, Gallagher offered this explanation: " . . . any material shifting or drifting of the deck from its central position in the tank shall be immediately checked by the descent of the weights at the opposite side from that toward which the drift occurs . . . said weights, through the overlapping relation of the whole series of sealing plates, tend to transfer and apply pressure outwardly on the free ends of the sealing plates at the side of the deck approaching the tank wall."

Several years before its proposed use on oil storage floating roofs, an under-deck counter-weighted pusher was suggested in Europe (Ger. 346,583) to

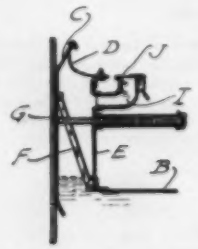


FIG. 7. Hiding the Hangers. Rotatable hanger (F) exists in the shadow of seal fabric (D), which connects shoe (C) and floating roof. A portion of pusher (G) is also in the shade.

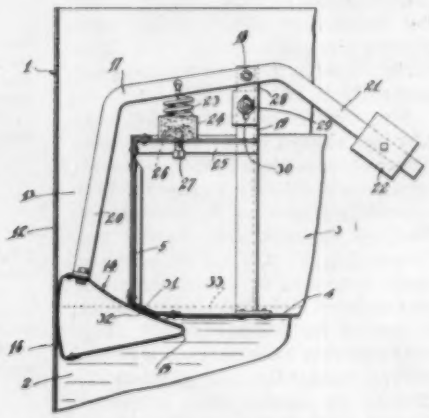


FIG. 8. S. P. Johnson Roof Centerer. Counterweighted (22) lever (21 provides beneficial impetus to shoe (14) with aid of pivot (18) and pusher arm (17).

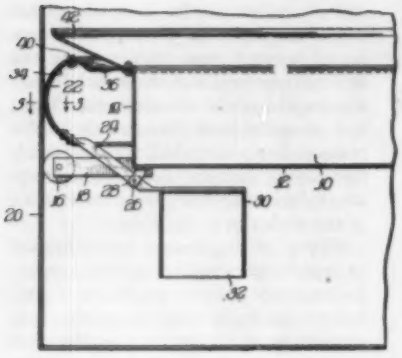


FIG. 9

FIG. 9. The Negatively-Weighted Pusher. Unsinkable cylinder (30) buoyed by tank contents, maintains shoe (22) against tankshell (20). Pivoted pusher arm (24) transmits the beneficial force.

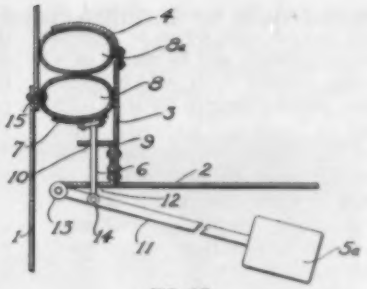


FIG. 10

FIG. 10. The Squeezed Balloon Seal. Float (5a) persistently attempts to give an elliptical cross section to inflated members (8) and (8a) trapped in the annular space between tank shell (1) and deck rim (3). Lever arms (11) and (6) are pivoted at points (13) and (14) respectively.

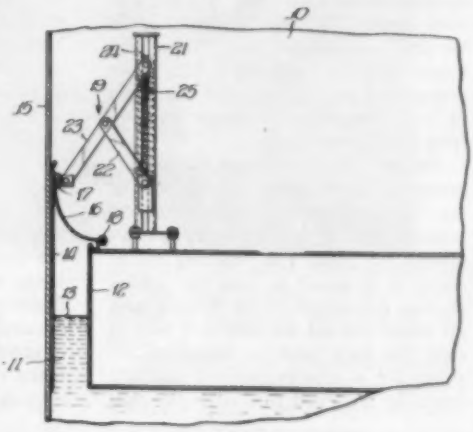


FIG. 11

FIG. 11. Wilkin's Constant Elevation Hanger. Horizontal movements of the floating deck do not affect the elevation of shoe (14) because head of hanger (23) is maintained in constant horizontal plane by arm (22) and track (21). Tension spring (25) lends hanger some pusher characteristics.

hold a shoe against the shell of a dry-seal gas-holder. The lever was pivotally located below the deck of the gas tank floating disc, and exerted an outward force against the shoe through a horizontal piston.

Parenthetically, the first American under-deck pusher was disclosed in 1927, by Patterson, who suggested roof-centering devices consisting of arms pivoted beneath the deck and bending downward and outward to the oil-tank shell. The pushing pressure against the shell was supplied by compressed springs (U. S. 1,774,943).

In contradistinction to the counter-weighted levers that utilized the force of gravity to push a shoe against the tank shell, Welp (U. S. 1,986,869) proposed employing the pressure exerted by the tank contents against an immersed buoyant object. (Fig. 9.) His 1932 design submerged a buoyant cylinder in the liquid below the roof deck and rigidly connected the cylinder to the shoe bottom through an arm that was pivoted at the deck rim. The arcuate shoe was in continuous contact with the shell, and any tendency to close the normal distance between the shoe and the deck rim was opposed by the reactive force created as the tank contents resisted further immersion of the buoyant float.

Previously, Haupt (1,735,461) had proposed a submerged buoyant lever to apply vertical compression to inflated balloons squeezed in the space between deck rim and shell; this was one of many so-called "tire-seal" inventions, involving flexible, fluid-filled containers wedged into the hiatus between roof and shell. (Fig. 10.) A recent balloon-seal design in conjunction with a vertical shoe, has been devised by Cord et al (2,664,220).

Although considerable ingenuity was applied to "pusher" development, the hangers were never neglected for any considerable length of time, either.

Larson proposed a hanger improvement designed to overcome a major defect of the simple pivoted hanger; the simple hanger persuades the shoe to travel some distance vertically in order to adjust for ordinary horizontal movements of the floating roof. Larson's invention (U. S. 1,931,551) consisted of an above-deck arrangement involving a long, horizontal spinal column pivoted at its rear and bent downward at its neck. The head of the column connected to the top of the shoe. The tail and the neck were pivotally attached to upstanding legs extending from swingable connections on the deck. The result was something of a pantograph effect, allowing the floating deck and the column to move considerably in opposite horizontal directions without substantially affecting the elevation of the head or the shoe.

L. A. Wilkin (U. S. 2,542,444) showed a combination pantograph, above-deck hanger and pusher arm designed to retain the shoe in unaltered relation to the roof in a vertical direction regardless of horizontal drifting (Fig. 11.) The lower end of the main hanger arm was pivoted at the top of the shoe. From there, the arm extended upwardly and inwardly to its other terminus, which was subject to the downward pull of a vertical spring. The spring resided in a stationary housing on the deck. Another straight bar made pivotal guide connection between the spring housing and the hanger arm. The hanger arm and the vertical spring form, respectively, the hypotenuse and the vertical leg of a right-angle space triangle. As the roof approaches the tank shell, the vertical spring expands as the lower end of the hanger arm slips inward while maintaining a constant elevation. Thus, the shoe height remains unaffected.

An undercover pantograph-type mechanism located below the seal fabric was suggested by Boberg for continuously holding the shoe in a vertical plane parallel to the deck rim and shell, regardless of the deck movement. This idea (U. S. 2,471,404) consisted of a straight hanger running upwardly and outwardly from a pivoted connection at the deck rim to a similar attachment on the shoe. At the midpoint, the hanger was hingedly connected to a "positioning bar" running diagonally downward from a vertically slidable connection at the deck rim to a rolling contact with the shoe, completing the mechanism.

Plummer (U. S. 2,478,422) suggested the use of concealed stems constructed simply of leaf spring material extending upwardly and outwardly from the bottom of the deck rim to the shoe. Their purpose was to support the shoe at the desired elevation and also urge it against the tank shell.

Wiggins devised a spring-powered mechanism whose force is created

above the deck but is soon allowed to burrow out of sight down to a level below the primary seal by means of a rotatable, vertical shaft, which transfers this pushing force to the shoe with the aid of below-seal horizontal arms (U. S. 2,287,211). An auxiliary seal (2,540,801) was designed that can be perched atop the shoe, and is deliberately unbalanced so that a wiping wing leans snugly and continuously outward against the tank shell.

A below-seal pusher and hanger combination designed to center the roof while holding the vertical shoe against the shell was suggested by Moyer and Fraser (U. S. 2,518,488). The main component of their mechanism is an "L" (or leg)-shaped pusher hanging from outside the deck rim.

The hip of this pusher is pivotally connected to the deck rim; the foot of the "L" is weighted, and submerged beneath the deck; the knee pushes against the shoe. The resulting mechanism is designed so that any action causing movement of the floating roof off center toward the shell will tend to raise the foot, and is, therefore, resisted by a gravity-inspired reaction from the weighted foot that transmits a harder push against the shell through the shoe. The upper portion of the seal shoe is held in place by a hanger bar that extends up from the base of the pusher to a pivoted connection at the shoe.

In another step (U. S. 2,587,508), Moyer and Zick cross-mated the hangers and L-pushers to swing in parallel planes around a mid-point pivot common to the pair. (Fig. 12.) In normal operation, the pusher knee hovers in close proximity to the shoe, but generously transmits to the hanger arm the privilege of delivering the roof-centering force to the tank shell through the shoe. The hanger also performs its titled task of carrying the shoe, and, in addition, partially assumes the responsibility for holding the shoe elevation static during lateral movements of the deck.

In 1953, Ulm (U.S.2,650,738) publicly proclaimed further theories for the design of equipment to seal effectively the annular space around the floating roof. (Fig. 13.) This patent maintained that it would be impractical to provide hangers with sufficient resistance to oppose with equal vigor the maximum "roof — un-centering" power available at the discretion of nature's atmospheric elements. It proposed hanger arms that possess the flexibility to "roll with the punch" when abnormal conditions demand. Thus, one component of this new defensive platoon is a swingable, spring-guided, telescoping hanger that extends upwardly and outwardly from the bottom of the deck rim to the shoe.

Utility of this hanger is not limited to inclement weather periods, either. In many instances in which a stiff hanger guides a shoe along the tank shell, a local obstruction on the shell (such as a seam of rivets on an old tank) may cause the shoe to bend inward slightly. This action may require a rigid hanger to pivot back and up in a vertical plane, carrying the shoe upward with it. The chain reaction created often results in further buckling of the shoe in adjacent areas in both the horizontal and vertical planes. The same train of events may occur when the roof drifts off center.

The telescoping hanger, however, absorbs the shock of any obstacle on the shell by merely retracting and acting like a hanger whose length had been accurately measured to meet that par-

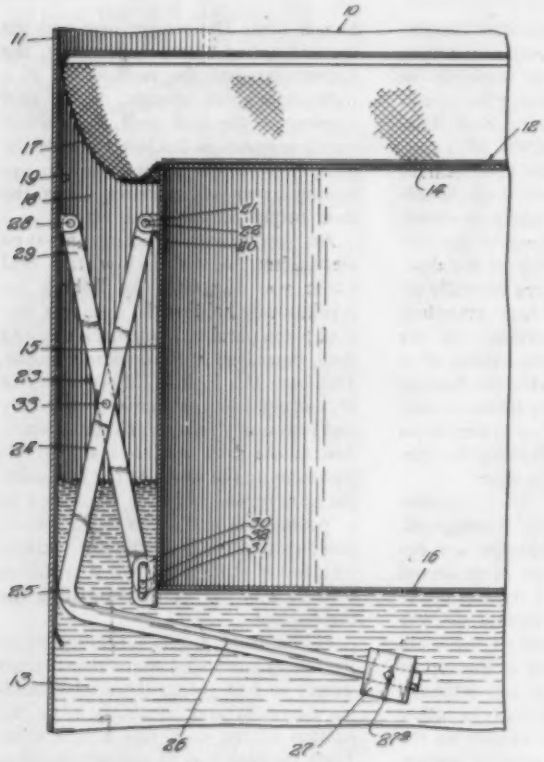


FIG. 12. Moyer's Multi-Purpose Mechanism. Weighted leg (26) and hanger (29) are pivotally mated at (33) to maintain shoe (19) in a desired position and floating roof (12) in a concentric location. Pivot points (22) and (28) lie in the same horizontal plane.

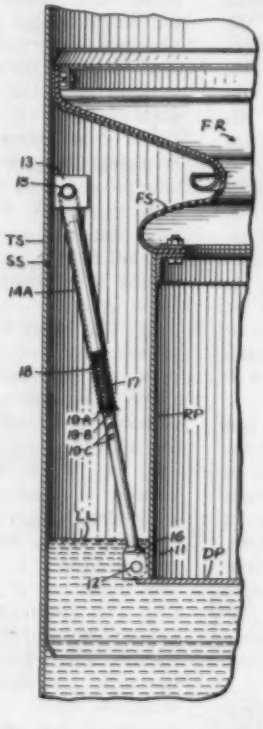


FIG. 13. ULM's "Chameleon Hanger." Retractable hanger arm is aided by compression spring (17) in maintaining shoe (SS) in optimum way, shape and form.

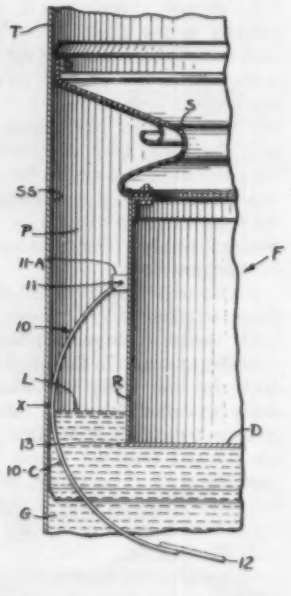


FIG. 14. Roof-Centering Force of Allen and Ulm. Arcuate pusher (10) pivoted at (11) and weighted at (12) maintains floating deck (D) in a central position.

ticular situation. If and when the obstacle is passed, the hanger length changes to the proper dimensions required for any new circumstance. The retractable character of the hanger also allows the floating-roof deck to approach the shell at close quarters without distorting the shoe ring.

In cooperation with Allen, Ulm also (U. S. 2,669,372) devised arcuate, weighted pushing arms to act in rolling cooperation with the novel hangers. (Fig. 14.) These pushers, curved to a single radius, are pivotally connected to the outside of the deck rim. From that vantage point, they curve downwardly and outwardly until their convex surfaces make pressing contact with the vertical shoe. Then, the arms curve back beneath the deck until they reach their weighted, bottom extremity.

The weight on the arm complies with the law of gravity and the law of moments to retain the roof in a central location as the pusher directs a pressure against the shell through the lower area of the shoe.

If external forces urge the roof toward the shell, the weighted portions of the pushers are raised on the imperilled side of the roof. Furthermore, the circular arc of the pusher then wheels into its inherent rolling action to elevate the plane of pressure application. Thus, the moment arms affecting the resisting force against the shell are immediately benefited, "applying the brakes" against continued roof travel. This seal design has proved its merit under all conditions, favorable or adverse, including the scrutiny of vigorous research and in the protection of billions of gallons of flammable fluids.

We have discussed only a small fraction of the methods proposed and used during the past three-quarters of a century to store with safety and economy the immense volumes of volatile liquids required by industry. Although facilities for continued research are adequate, it is recognized that more than ordinary effort will be required in the next 75 years to satisfy new and more stringent demands in industrial liquid storage.

Note

A complete list of floating roof patents will be published at a later date by the author and will include a comprehensive bibliography concerning the storage and conservation of volatile liquids and gases.

References

1. *Early Days of Oil*, Paul H. Gliddens, Princeton University Press, Princeton, New Jersey, 1948.
2. U. S. Patents cited.
3. "Applied Methods and Equipment for Reducing Evaporation Losses of Petroleum and Gasoline," Ludwig Schmidt, *U. S. Bureau of Mines Bulletin 379*, U. S. Government Printing Office, Washington, D. C., 1937.

(2) Small Mass Spectrometer Applied to Mud Logging

Technicians at Hycalog have put into use a mass spectrometer rugged enough and small enough for field conditions so that well logging can now be made infinitely more accurate.

The mass spectrometer and RF (radio frequency) gas analyzer, also developed by Hycalog, are estimated

to be 25 times more accurate than the old hot wire detector and are equally as fast in logging of mud and of cuttings.

The objective of such detection type instrument in well logging is to find sub-trace quantities of hydrocarbons which will occur in gaseous or vaporous states during drilling operations. It gains many times in sensitivity by being keyed to the predominate peaks of these gases. The interrelation of certain masses at peak heights allows detection and identification of minute amounts of hydrocarbons that it has been impractical heretofore to find under field conditions.

The mass spectrometer also solves the problem of analyzing mud which has been contaminated with oil in the pit. Contaminates are readily identified and natural or fresh hydrocarbons are easily isolated and measured. The spectrometer furnishes a double check by detecting the presence of heavier hydrocarbons which, at times, escape detection under the ultra violet light. This is extremely valuable in logging and offers a higher degree of accuracy in drill stem test and in analyzing side wall and regular cores.

Hycalog's first experiments with the mass spectrometer proved that the instrument would give valuable additional information to the well logger. However, the original model, a laboratory research unit, weighed 600 lbs, was bulky, consumed 2000 watts, and was unfit for well site use. Engineers solved the problem by reducing the weight to about 300 lbs, cutting power consumption to a little over 1000 watts and reducing the size to that of a small table height cabinet.

Hycalog, Inc.

(3) Pattern Shooting with Variably Effective Elements

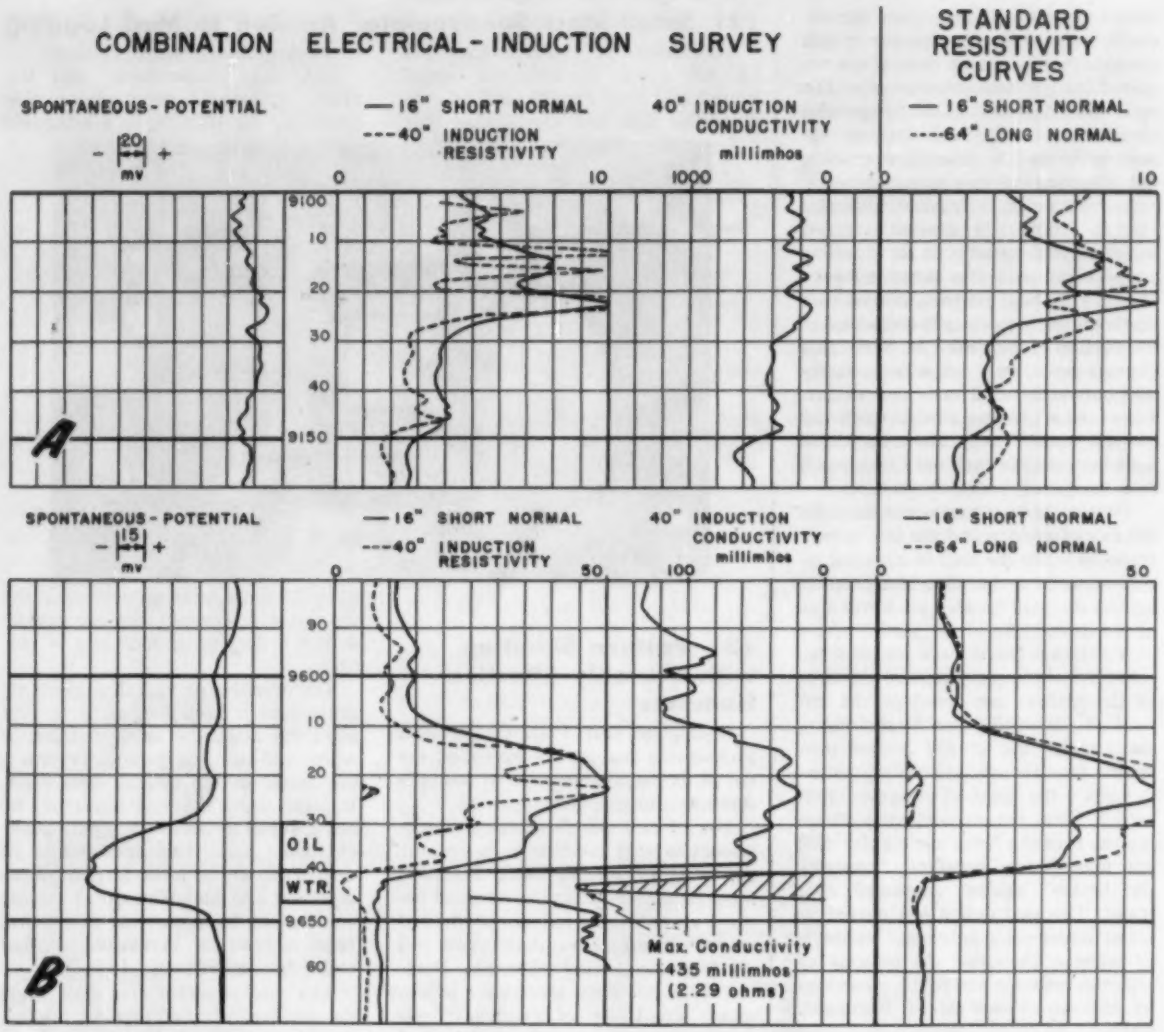
During the year, Petty Geophysical Engineering has greatly expanded the use of its patented method of multiple shothole and geophone shooting.

Use of multiple shotholes and geophones is well established in seismic surveying in difficult areas. Improvement in record quality is obtained because spaced arrays reduce the effect of unwanted surface-traveling waves and reinforce the desired reflections. Heretofore, it has been customary to use arrays consisting of shotholes with equal charges and geophones of equal sensitivity. It has been found that greatly improved results can be obtained by varying the relative effectiveness of the various units in a particular manner.

The method was developed as a result of theoretical studies of the behavior of generalized arrays. These studies explained the often observed experimental fact that increasing the number of units almost without limit often results in little improvement in record quality. Further investigation showed that extra units could be efficiently utilized if the outside units of the array were assigned less relative effect than the center units.

Choice of gradation can be made to fit a wide range of specific problems. In similar manner, greater efficiency can be obtained with a given number of units. This is of great importance, of course, as the number of units in use approaches the economic limit.

Petty Geophysical Engineering Company.



Greater detail on the induction resistivity curve in the section from 9100 to 9124 — greater even than on the short normal. Clear measurement of the hard streak at 9122 in which the long normal shows a reversal due to critical bed thickness.

Accurate true resistivity recording in the oil and water bearing sections from 9630 to 9646, where the long normal reads too high. Dramatic indication by the induction conductivity curve of the oil-water contact at 9640.

(1) Electric-Induction Log Improves Interpretation

A new Combination Electrical-Induction Survey engineered by Schlumberger incorporates advantages given only by the induction log while retaining important features of the electrical log. The result is a more easily and accurately interpretable well log with fewer component curves.

The induction log was introduced by Schlumberger a decade ago as a tool for obtaining a survey in non-conductive oil-base mud or empty holes.

The combination logs consist of the Spontaneous Potential and Short Normal curves, retained from the electrical log, and two 40-in. induction curves. One of these is recorded as a resistivity curve in the same track as the Short Normal. The other, for more precise evaluation, is recorded as a conductivity curve in the right hand track.

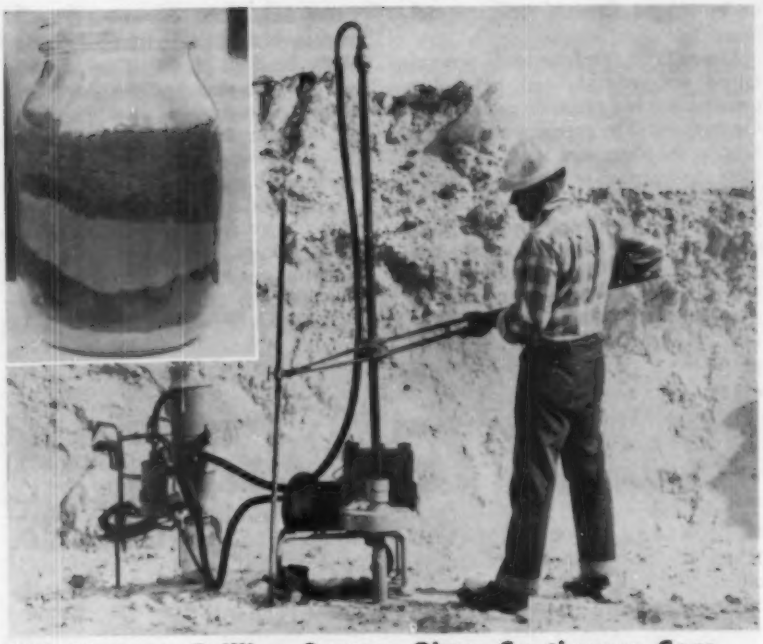
The SP and Short Normal resistivity curves retain the function of correlation long established in the electrical log. They also provide some factors used in quantitative log analysis.

The induction log, replacing the long normal and lateral curves, has the following advantages:

1. It is symmetrical over the thickness of the formation and has none of the lags, shadow zones, and reflection peaks that confuse interpretation of the long normal and lateral curves.
2. It gives more detail on thin beds because it is focused into the formation immediately in front of the tool.
3. Its focused character also reduces effect of adjacent beds.
4. It reduces the effect of the mud column.
5. It reduces the effect of the invaded zone.
6. Its conductivity curve gives greater accuracy in low resistivities and in true resistivity determination.
7. It enables more accurate determination of oil-water contacts.

Some of these advantages are clearly presented by the accompanying log sections comparing the Electrical-Induction Log to the present standard resistivity curves.

Schlumberger Well Surveying Corporation.



(4) Vacuum Drilling System Gives Continuous Core

By using reverse circulation and drawing a partial vacuum inside the drill stem, the 125-lb, one-man Mighty Midget rotary drill offers a complete and continuous core showing stratus as they are being drilled.

The Midget was specially designed to meet exacting big rig requirements yet small enough to be portable and easily transported.

This new system requires no water, but uses vacuum to remove the cuttings, making the drill especially successful in broken and open-fissure formations. This also makes it ideally suited for remote areas and locations.

The Mighty Midget is rated to drill an inch and three-quarters hole over 100 ft of difficult formation. Fully automatic drive through friction-type clutch with simplicity of motor drive allows transmission to swivel and permits operation through a 360 deg range. The drilling rig is completely self- contained using a 9-hp McCulloch gasoline engine to drive both the rotary table and air pump, assuring synchronized movement between the drilling unit and the circulation system.

A centrifugal force water pump may be fitted in place of the vacuum pump as optional equipment without alteration to the drilling frame. This converts the drill to normal rotary operation, using water as a circulation agent.

Weighing only 125 lb, the drill is a compact and portable unit. Its rugged construction and light weight are combined to give extreme versatility. It may be mounted on a light pick-up or jeep, airborne by helicopter or plane, attached to a small boat, put in the trunk of a car, or packed on the backs of two men to be carried into remote terrain.

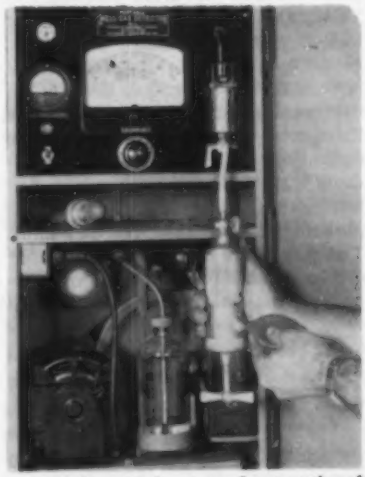
This new system of vacuum drilling eliminates the need for roads and water hauling to drilling locations and will give a complete analysis of deposits and stratas faster at far less cost.

The Mighty Midget portable rotary drill and the Hi-Vac Vacuum Circulation Systems are engineered and manufactured by Houston Tool Company.

Houston Tool Company, Inc.

(5) Automatic Gas Logger Features Exceptional Sensitivity

Petroleum Instrument has announced a compact, self-contained



automatic gas logger of exceptional sensitivity.

This unit contains many features that make it suitable for continuous, economical logging by an operator's own drilling crew, even in those cases where marginal prospects are being investigated.

The gas logger can detect gas in mud that cannot be detected by weight change or smell, the manufacturer claims, and it can detect gases in cores and cuttings that cannot be detected by smell or taste. This sensitivity is an important advantage over earlier gas-detecting devices.

Gas logger is easy to operate by any geologist, driller, or engineer. It is only necessary to plug the unit into the rig lighting system for power and to adjust a single control.

A special sample housing is provided to permit very sensitive tests of cores and cuttings.

Equipment is self-contained in a steel housing with a protective door. Handles are provided for ease and safety in moving. The housing size is only 12 in. x 14 in. x 27 in., and the unit may be carried in an automobile trunk during moves.

The portable automatic gas logger makes continuous, 24-hr logging economical and practical. It helps operators determine when to core or drill stem test and also enables operators to estimate the desirable depths for side wall cores.

Petroleum Instrument Company.

(6) Scintillation Unit Has Improved Sensitivity

Precision Radiation Instruments has announced the new Model 118C Royal Scintillator, which has been described as the most sensitive instrument of this type to be manufactured on a commercial basis.

This precision engineered instrument is designed for professional geophysicists engaged in oil, uranium, laboratory, and other radioactive survey work, but its operation is said to be simple enough for a layman to use it.

Detecting element of the 118 C is a thallium-activated sodium iodide crystal 7 in. in diameter. This crystal, said to be the largest ever used in a commercial scintillation counter, is hermetically sealed and optically coupled to a 5-in. photo-multiplier. As a result of an extremely fast counting circuit and the large crystal, the 118C Royal has a counting rate of 6,000,000 counts per minute in a one milliroentgen field of radiation. The manufacturer not only claims it to have the highest counting rate of any portable instrument, but the steadiest meter reading of any scintillator counter.

Besides its use as a ratemeter, this Royal Scintillator can be operated as a

most efficient scaler, including easy, accurate measurement of low levels of radiation.

The 118C has four response rates — 1 sec, 5 sec, 15 sec, and 45 sec.

Recorder operation has been greatly simplified. A preamplifier is built in, enabling the 118C to operate a recorder directly, eliminating the need for carrying extra equipment. The 118C Royal is supplied with an extra meter and an extension meter cable. The extra meter can be mounted at any convenient point away from the instrument. The meter dial is illuminated for night use.

The Model 123 "Squealer" is available for use with the 118C Royal to give an audible signal in the presence of radiation, thus enabling the operator to monitor radiation levels without having to watch the meter while making aerial or motor vehicle surveys.

Precision Radiation Instruments, Inc.

Drilling Rigs and Equipment

(14) Torque Converter Tailored for Drilling

A new line of heavy-duty hydraulic torque converters of high efficiency for transmission of 100 to 1000 hp to industrial machinery has been announced by National Supply.

These National Torque Conver ers are offered in two types and six basic sizes, with modifications of hydraulic circuits to provide 17 power ratings in closely spaced ranges.

The torque converter line was extended downward in size from 34.2 in. diam to 18.1 in. diam over a period of

three years during which the first units demonstrated trouble-free operation under rugged oil field service conditions.

Dependable performance was attained not only through heavy-duty construction but precision manufacturing methods. The precision required in holding the aluminum alloy blades and fluid passageways in the hydraulic circuit to design contours was obtained by development of an entirely new precision casting method. Parts are machined to close dimensional tolerances and rotating parts of all converters are dynamically balanced during assembly. One of the features of the torque converter is an exceptionally high efficiency in power transmission.

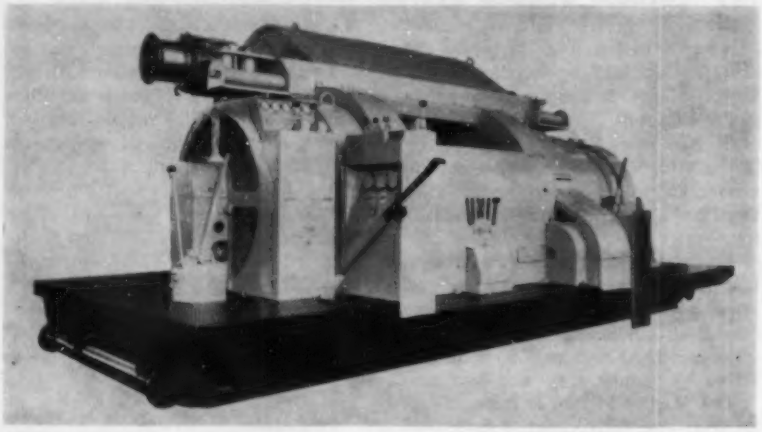
Features of the Series B torque converter include the use of SAE 10 oil for converter fluid and for lubrication of the bearings. A simple leakage system through seals and overflow ducts keeps the bearings supplied with fresh oil. Another feature is a case design that gives versatility of mounting in any position with or without an integral oil-cooling system, and radial openings 90 deg apart for easy access to valves, filters, pumps, and piping. When the oil cooling radiator is mounted on the converter, its fan is driven from the output shaft of the converter. National supplies mountings that adapt all converters to all makes and models of engines with which they will be used.

National Supply Company.

(8) Drawworks for Medium to Deep Drilling

Unit Rig Model U-914-A Draw Works is rated at 900 to 1400 input horsepower for medium deep drilling, either inland or offshore.

It features an extra large drum, water circulating brake rims, and identical high and low-drum clutches (38 VC-1200 ventorque with a positive lock-in on the low clutch). Direct-connected hydromatic or dynamatic auxiliary brake is controlled through an overrunning gear-type clutch. Brake linkage is grease-lubricated from one centralized location and can be lubricated while the rig is in operation. Lubrication of the transmission is accomplished by two chain-driven oil pumps. The pumps are manifolded and either can furnish adequate lubrication if necessary. The hoisting drum, transmission, rotary countershaft, and auxiliary brake are all mounted on a single skid 9 ft wide by 21 ft 2 in. long. Approximate weight of the unit is 45,575 lb.



The three forward drives and the sliding gear reverse in the transmission combine with the two drum drives to offer six forward and two reverse speeds at the drum. One reverse and three forward speeds are available at the rotary countershaft, catshaft and optional sand line drum. All hoisting drives and transmission chains are 1¾ in. pitch quad. The rotary countershaft and catshaft drive chains are 1¾ in. pitch double. All transmission shaft support bearings are identical and all sprockets are induction hardened.

Major design criteria for this new rig have been simplicity of construction, ease of operation, and rugged dependability for long, trouble-free service. The drum shaft diameter is 7.875 in. under the bearings, and the bearings are on 76 7/16 in. centers. Transmission shafts are 5.907 in. in diameter under the bearings and the bearings are on 57 in. and 14⅛ in. centers. This combination of large shafts, large bearings and short bearing centers provides maximum strength with a minimum of weight.

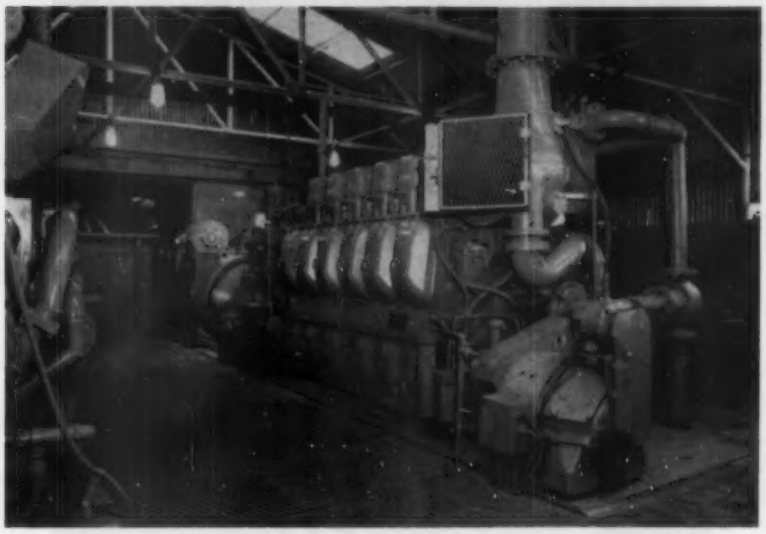
Special attention has been given to corrosion problems, particularly for offshore operations. Critical hardware and linkage are cadmium plated plus iridite finish to provide extra protection.

Unit Rig and Equipment Company.

(7) Diesel-Electric Power Package Designed for Drilling Requirements

Alco Products has developed a drilling rig power package combining the advantages of simplified electrical control with efficient diesel power.

Base package consists of two skid-mounted engine-generator sets, one 1370-hp drawworks drive assembly, two 600-hp mud-pump drive assemblies, and complete controls. Package is supplied with two 850-hp Alco



model 251-B diesel engines, both of which are equipped with a water-cooled turbosupercharger operating from exhaust gas.

If one engine-generator set fails, the rig can still be operated at full torque, only at half speed. Drawworks and mud pumps may be operated singly or in combination.

Many modifications are offered, including rotary-table drive, coring-reel drive, mud-mixing pump drive, 1200-hp mud pump drives rather than the 600-hp drive in the basic package, an extra engine-generator set, drawworks drive up to 2055-hp, and other special features.

The variable-voltage type electrical system permits variable motor speeds with a constant engine speed. This means that all power built into the package is instantly available.

Power package is self-contained and requires no independent or auxiliary source of power outside of the main power units. Each engine generator has an auxiliary generator large enough to furnish power for lighting, bug fans, shale shakers, air compressors, and other apparatus.

Alco Products, Inc.

(9) Two Rigs Introduced for Slim-Hole Drilling

Joy Manufacturing has announced two new portable rotary drills for use in slim-hole production and exploration drilling. Similar in design, the two drills, designated as the Models 510 and 340, make up the Joy 5000 Series of truck or trailer-mounted drilling rigs.

Model 510 is designed for drilling to a depth of 5100 ft with 3½-in. drill pipe or 10,400 ft with 2½-in. tubing. Features include an oil bath rotary table with 18-in. opening and API taper, air-operated clutches, hydromatic brake for hoisting drum, and 85-ft mast with 80 ft of clearance between top of rotary table and bottom of crown block, capable of pulling Range 2 doubles.

Model 340 is designed for drilling to a depth of from 3400 ft with 3½ in. drill pipe to 6950 ft using 2½-in. tubing. It features an oil bath rotary table with 12-in. opening and API taper, air-operated clutches, optional hydromatic brake for hoisting drum, a 65-ft mast with 57 ft of clearance between top of rotary table and bottom of crown block, capable of pulling Range 1 doubles with the standard mast.

Mounted on a single trailer, both models are within highway limits and can be moved onto location and rigged up within a few hours.

All controls are air operated and conveniently grouped at the operator's position, giving the driller full view of the entire drill at all times.

The masts are of sectional, flanged construction of welded, seamless steel tubing, rigidly braced, and tapered three ways. It is equipped with folding pipe rack and safety working platform, and is raised by telescoping hydraulic jacks. Rated working load of the masts is 80,000 lb. Five feet of clearance is provided under the rotary table.

Torque converters and breakout and spinning catheads are available on both models. Air-operated, high and low-speed clutches on hoisting drum are designed so that the driller has the proper speed for hoisting the empty blocks when making a trip, and also the proper speed and power to hoist and lower the drill string. Both engines drive to a compounded drivecase that permits either or both power units to be used independently or compounded.

Joy Manufacturing Company.

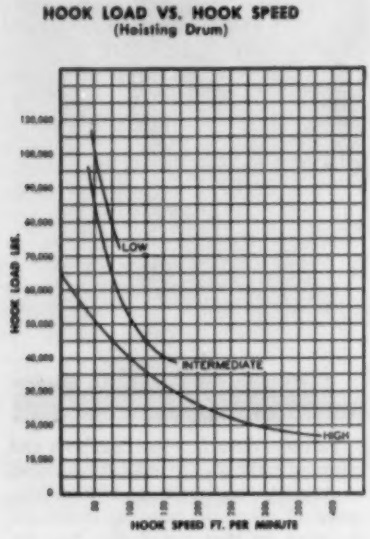
(11) New Slim Hole Rig Features Portability

A new slim hole rig is being produced by the George E. Failing Company, a subsidiary of Westinghouse Air Brake Company. New rig is called the

Stratmaster and it is capable of drilling to depths of 6500 ft with 2⅞ in. drill-pipe. It has a hook load capacity of

100,000 lbs.

Failing Stratmaster is 8 ft wide, 50 ft long and weighs 50,000 lbs, affording maximum portability in a legal highway package. Because of the single



Engine Net H.P. Output 180
Lines Up 6
Transmission . . . . . Allison TG-607
Low Range 4.4-1
Intermediate Range . . . 2.33-1
High Range 1-1
Allowed for Block . . . . . 1850 Lbs.

All losses have been deducted . . . . engine torque converter, transmission, drawworks and lines.

trailer mounting, rigging up time is held to a minimum. Other features include: no guy wires on mast or working platform; one lever control for clutch and throttles; all controls air operated; five foot clearance under rotary table without trailer ramps; torqmatic transmission with three forward and one reverse speed, permitting shifting under load; torque tube drives to drawworks and rotary table.

Stratmaster is being used for deep stratigraphic exploration and production drilling.

George E. Failing Company.

(10) Air-Cooled Diesel Powers Mobile Rig

An effective new oilfield application for one of Europe's best-known diesel engines has been announced by Ideco. A 12-cylinder, 250 hp, air-cooled diesel engine built by Deutz in Cologne, Germany, has completed extensive operational tests as a dual-purpose power unit for Ideco's self-contained servicing and workover rig—the Drive-In Rambler.

The Deutz engine provides power for rig operation as well as propulsion at highway traffic speeds. A General Motors torque converter and an Allison three-speed transmission provide a wide range of speed and torque for pulling a heavy string of pipe out of the hole, climbing steep hills, or covering more than 350 miles in a single day on the road. Among the features of the air-cooled diesel contributing to its economical operation are its relatively light weight for horsepower and its higher cylinder wall temperatures. With no radiator, water jackets and other items usually required for water-cooled

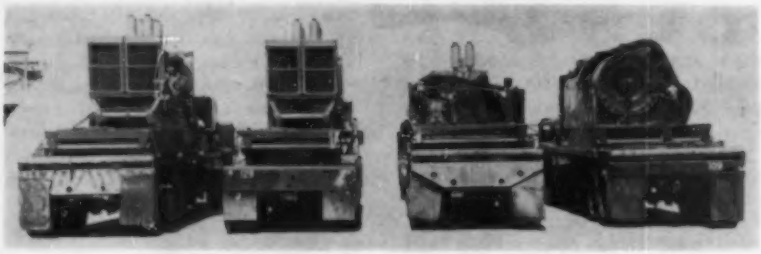
engines, the 250 hp Deutz engine weighs less than 2800 lb including accessories. With no large volume of water to heat up, engine starts much faster and gives perfect conditions of lubrication immediately after starting. This eliminates the fuel-wastage of the common warm-up period, gives more complete fuel combustion, and prevents dilution of crankcase oil from the by-passing of unused fuel.

Maintenance of the Deutz engine is simplified because of its unique unitized construction. Each cylinder, with its separate head, may be removed and replaced independently. Cylinder units, pistons and rods are interchangeable within the same engine and between other Deutz engines of various sizes. This permits a minimum inventory of replacement parts, not only for the rig prime mover, but also for smaller engines on the location used for lights, air, water and mud mixing.

Ideco has been appointed exclusive Deutz representative to the world-wide petroleum industry. Parts and service headquarters are centered in Ideco's Beaumont, Texas plant.

Ideco

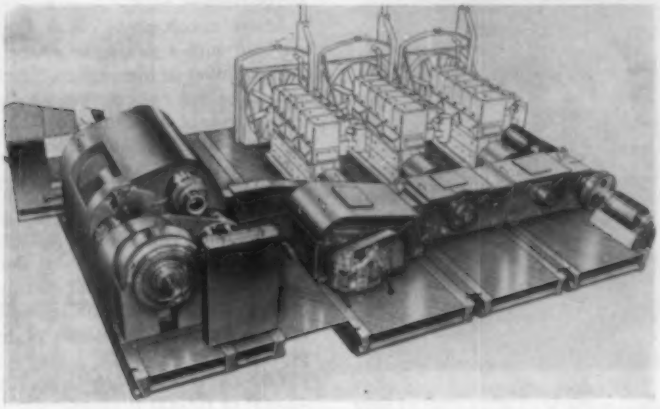
(12) Heavy Duty Rig Offers Packaged Portability



A heavy duty rig for the drilling of medium and deep wells, yet so portable that it can be ready for shipment in but a few hours, describes Emsco Manufacturing Company's popular new model, the A-800. Power plant and all, the rig can be broken down into four self-contained skid mounted units in a matter of hours, ready for transport on road width trucks.

Units break down as follows: Drawworks Unit — drumshaft, catshaft or optional sandreel shaft, jackshaft, rotary countershaft and drilling console; No. 1 Engine Unit—drilling engine, selective transmission and section of

power end; No. 2 Engine Unit—engine and a section of the power end; No. 3 Engine Unit—engine, a section of the power end and two pump drive countershafts.



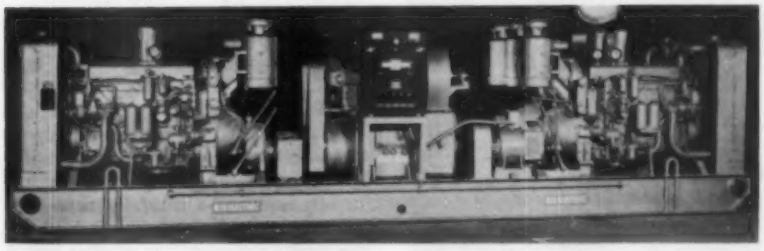
The entire rig can be broken down or set-up with ease. The three engine units flange bolt together. During moving, only the cover of the No. 2 Engine Unit need be removed to disconnect the chains between the sections. Gaskets are unnecessary as connections between compounds are flanged, with labyrinth seals. Covers seal the open ends of cases. Engine unit skid bases are doweled for positive alignment. The drilling console, with all operating valves and gages, is roller mounted on the drawworks skids and is retracted when the unit is to be moved. Air and oil lines need not be disconnected at any time. When the rig is set up, the console is rolled forward from the drawworks for an unobstructed view of floor and derrick operations.

In addition to its "packaged portability" the A-800 incorporates many other new design features. "Fabriform" construction is used throughout, accounting for much of the unit's lightness but with no sacrifice of rugged strength. The drum is fabricated from electrically welded plates and heavy wall tubing. Brake rims are bolted onto the flanges and precision balanced. Exclusive new high capacity diaphragm-operated air clutches are used, eliminating packing drag, reducing engagement and disengagement time and making lubrication unnecessary. Engines have push-button speed selection.

When all engines are compounded, the operator can use any of six forward and two reverse speeds for hoisting. Three forward and one reverse are available for the rotary.

Emsco Manufacturing Company.

(24) Diesel and Gas-Electric Rig Power Unit



Stewart & Stevenson Services has announced a new line of engineered gas and diesel d-c drilling rig power drives. These engine electric systems are called Rigelectric and are available with either the General Motors Detroit Diesel or Climax natural gas engine as the prime mover.

Standard basic power pacakges consist primarily of two models, the Model S12500 and Model S241000 units.

Model S12500 unit consists of either two Model 6-110 General Motors Detroit Diesel engines rated 250 hp each, or two Climax Model K-75 natural gas engines arranged in a manner so that one power unit is directly connected to each end of a heavy-duty, traction-type d-c generator.

Model S241000 Rigelectric d-c unit consists basically of either four Model 6-110 engines rated 250 hp each, or four Model K-75 Climax engines with the four engines utilized and arranged on a common, steel skid-type base and powering two heavy-duty, traction-type d-c generators with a capacity of 600 continuous hp each.

All four engines and the two generators are compounded in such a manner as to permit the power of from one to four engines to be input to either one or both of the two generators. Engines are connected to generator through heavy-duty disconnect clutches and flexible connections.

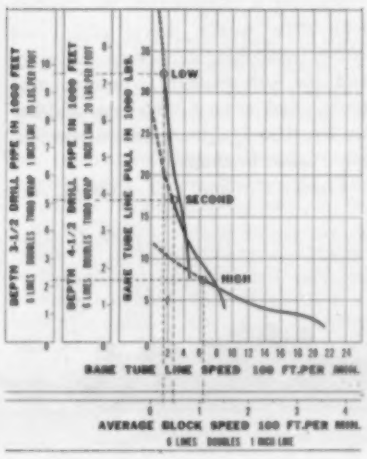
Particular attention has been given to simplification of the entire control system on the Stewart & Stevenson Rigelectric Equipment. To insure maximum simplicity and reliability, each motor is operated from an individual generator so that there is never more than one motor being driven from a single generator. This arrangement permits the use of a simple rheostatic, low-voltage control to a pilot exciter for each generator, which controls the speed of the electric motor without the necessity of complicated controls.

Stewart & Stevenson Services, Inc.

(23) Travelrig—A Mobile Unit

Cardwell Manufacturing Company announces a heavy duty self-propelled servicing unit for well servicing and slim hole work which is said to provide ultimate portability.

The Travelrig, a new Cardwell rig, has ample capacity to service and workover wells economically, from 5000 to 13,000-ft pulling 2½-in. tubing. The rig has high manueverability, which does not sacrifice its ability to do deep well servicing jobs. With a nominal input of 157 to 352 hp, this unit can be used as a rotary drilling rig to 4000-ft with 4½-in. drill pipe, or 3000 to 6500-ft using slim hole pipe. The rig is a double-drum converter-type, self-



propelled hoist with front and rear tandem axles.

This highly integrated rig offers a rugged built-in drawworks featuring large brakes and large drums for three-wrap spooling. The brake flanges are splash-water cooled and clutches are on the outside for easy accessibility.

The rear-mounted engine (which can be gas, gasoline, or diesel), powers the vehicle and/or drawworks through an Allison torqomatic transmission. Three speeds forward and one reverse speed are possible through the transmission (mounted amidship), and employs industrial universal joints, propeller shafts, and beveled gear box to drive the drums and cathead shaft.

Chassis is made of alloy steel of light weight and is of bridge-type construction.

Safety has been stressed throughout the new design. The four-leg, telescoping, structural alloy steel mast has a capacity of 150,000 lb and measures 96 ft from the ground to the crown. When the derrick is telescoping and folded in roading position, the unit offers ample visibility and is a legal width package.

Unit offers a modern hydraulic power system for the power tongs or hydraulic rotary table, if desired. A propeller shaft to the rotary table can be provided.

Cardwell Manufacturing Company.

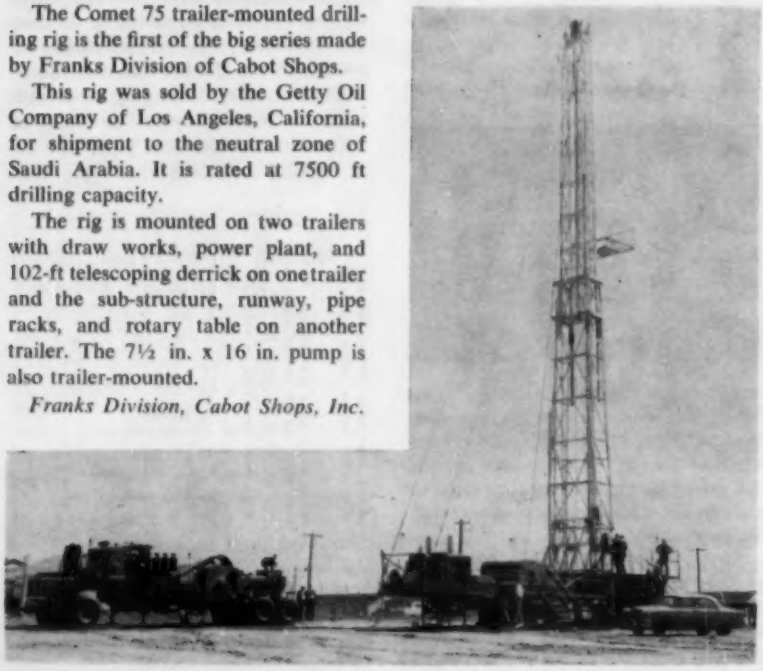
(13) First of the Big Rig Series

The Comet 75 trailer-mounted drilling rig is the first of the big series made by Franks Division of Cabot Shops.

This rig was sold by the Getty Oil Company of Los Angeles, California, for shipment to the neutral zone of Saudi Arabia. It is rated at 7500 ft drilling capacity.

The rig is mounted on two trailers with draw works, power plant, and 102-ft telescoping derrick on one trailer and the sub-structure, runway, pipe racks, and rotary table on another trailer. The 7½ in. x 16 in. pump is also trailer-mounted.

Franks Division, Cabot Shops, Inc.



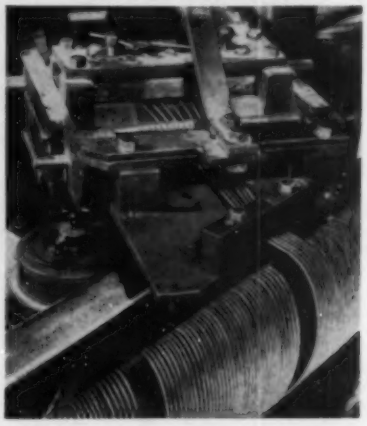
Drilling Equip.

(16) Rotary Hose with Extended Life

Many components of drilling rigs are sold with a guarantee of the minimum number of feet that can be drilled before failure or replacement. This is true of rotary hose that conveys drilling mud under pressure from the fixed standpipe to the Kelly swivel.

Not only are pressures high (2500 psi), but the drilling mud is abrasive and contains petroleum products and other chemicals. In addition, the hose must withstand continual flexing and bending as the Kelly is raised and lowered in handling thousands of feet of pipe.

Life Expectancy. Life expectancy of 45,000 to 60,000 ft of drilled hole per hose unit has long been a basis of service excluding accidents or operational abuse. With rotary hose with integral couplings developed by Thermoid, service life has been substantially prolonged, in many cases by as much as 500 per cent of the above figures.



Hose Construction. The most critical parts of the rotary hose are the coupling caps at each end. In the Thermoid rotary hose, the steel cables serve as the pressure-resisting members, the tube and fabric servicing primarily to contain the mud. The steel cables shown in photo are wound in a spiral in two layers at a carefully computed and maintained angle of lay. Ends of the cable are drawn through slots milled into a solid piece of steel tubing and anchored with set screws. The steel tubing extends beyond the slots a short distance. The outside end of the tubing is threaded to receive the coupling cap, which is threaded, also, for attaching to the standpipe and Kelly. The result is an integral hose unit with coupling caps fixed by positive mechanical means to the hose proper.

With this construction, the outside diameter of the hose at the coupling is

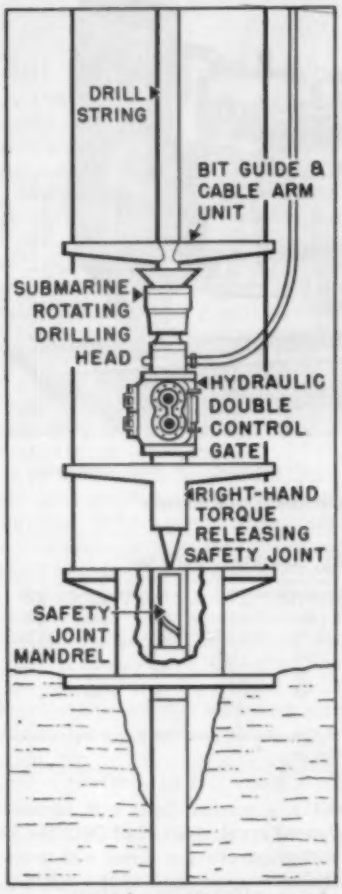
only slightly larger than the OD of the hose proper. Increase in diameter is achieved gradually and smoothly without projecting ridges, flanges, bulging or sharp changes in diameter.

Thermoid Company.

(15) Revolutionary New Subsea Drilling Technique

A completely new technique for drilling exploratory wells in subsea and offshore locations is revolutionizing submarine operations.

In this new technique, it is not necessary to place a costly stationary platform on the ocean floor in order to


DRILL STRING
BIT GUIDE & CABLE ARM UNIT
SUBMARINE ROTATING DRILLING HEAD
HYDRAULIC DOUBLE CONTROL GATE
RIGHT-HAND TORQUE RELEASING SAFETY JOINT
SAFETY JOINT MANDREL

carry out efficient drilling operations. Instead, any floating type of vessel can be used for drilling. Currently, converted LSM's, LST's and even flat-bottomed barges are being successfully used, permitting exploratory wells to be drilled at a fraction of the cost of using the more complicated methods.

Five tools pioneered and developed by Shaffer Tool Works are the key to the new technique. Three of these are modifications of well-known Shaffer products, while the other two are new products designed especially for this new subsea method. These five tools are: (1) The Shaffer Type 55 Kelly Cock with Side Ball-Insertion Port, (2) the Shaffer Oil-Sealed Drilling Bumper Sub, (3) the Shaffer Submarine Rotating Drilling Head, (4) the Shaffer Lightweight Hydraulic Double Cellar Control Gate, and (5) the Shaffer Right-Hand Torque Releasing Safety Joint.

Basically, the technique consists of anchoring the blowout equipment directly to the landed casing at the ocean floor, while the rotary table and other drilling equipment are installed in the conventional manner on the floating vessel. By means of two guide cables between the Submarine Rotating Drilling Head and the vessel, drilling procedures are virtually the same as for land-based drilling, except that the drilling string is connected to and disconnected from the Submarine Rotating Drilling Head each time it is run into or pulled out of the hole. This procedure, however, is extremely simple and is accomplished entirely from the rig floor without delays or inconvenience.

Of the five special Shaffer tools used in this new technique, the newest development is the Shaffer Right-Hand Torque Releasing Safety Joint. Broadly speaking, the tool is a large-diameter safety joint, but its design and operation are unique in that, once locked together, its mandrel and sleeve will not separate under rotational or any tensional or compressional loads. Complete release is effected by lowering a special trip bar into the tool, raising the locking sleeve and rotating a fraction of a turn to the right.

The Releasing Safety Joint is attached to the top of the surface string before it is landed and cemented on the ocean floor. After the safety joint has been released, the mandrel is left facing up. The sleeve portion of the safety joint is then made up below the blowout equipment and lowered over the mandrel on the ocean floor. Lowered into position, the sleeve and mandrel lock together *automatically*.

Blowout equipment consists essentially of a Shaffer Hydraulic Double Cellar Control Gate, with hydraulic controls on the floating rig deck, and a Shaffer Submarine Rotating Drilling Head (which is a submarine version of the well-known Shaffer Combination Rotating Blowout Preventer and Stripper).

With this equipment installed, normal drilling operations can be carried out. Drill pipe can be added or removed, completely withdrawn to replace bits, etc., without allowing sea water into the well or polluting the ocean with mud or oil.

Mud circulation is returned directly to the floating vessel through a flexible hose connected between the Submarine Rotating Drilling Head and the Cellar Control Gates. After inserting the drill string into the Submarine Rotating Drilling Head, circulation pressure can be established immediately, thus providing a double-check that the assembly is packed-off properly and ready for normal drilling procedures.

A Shaffer Oil-Sealed Drilling Bumper Sub is placed in the drill string to compensate for wave action and to keep the bit continuously "on bottom" regardless of the vertical movement of the floating vessel.

Shaffer Tool Works.

(17) Perfect Wire Line Spooling

Several years ago, LeBus International Engineers introduced what is claimed as the most advanced and revolutionary wire line spooling system ever developed. It is known as, "Counterbalanced Spooling."

This method, which is an improvement over all other methods, simply causes the wire line to spool onto the drum in a manner that completely bal-

ances the line on the drum.

Not only has this advancement contributed heavily to the longer life of wire line, but it has done much toward increasing the efficiency of drilling rigs. Wire line spooling as LeBus has developed it has become universally standard on almost every new drilling rig hoist manufactured. Estimated savings attributed to LeBus wire line methods are over $18,000,000 annually.

These systems entailed the changing of the angle control area by placing 50 per cent of line pitch in one control area on one side of the drum and the balance of the other 50 per cent of the line pitch at 180 deg, or directly on the opposite side of the drum core. The remainder of the grooving runs parallel with the flange. This system is said to absolutely balance the line as it spools onto the drum and eliminate drum vibration, and hazardous wire line whip. Also because of this new system, operators are now able to make their small rigs more flexible and drill deeper wells with them through the increased efficiency.

In developing systems, LeBus Engi-

neers has worked very closely with rig owners, rig manufacturers, and wire line company engineers. Through the years, one of the big jobs performed by LeBus Engineers was the education of rig operators on how to use successfully this new control for spooling wire line on rotary drilling hoists.

LeBus is the only exclusive manufacturer of grooving and controlled wire line spooling systems in the world.

LeBus International Engineers, Ltd.

(18) Cargo Crane for Offshore Operations

Unit Crane & Shovel announces the Unit Mariner Model 360. This machine is specially designed to meet all requirements for cargo handling from a stationary mounting.

It deviates from conventional revolving crane design by emphasizing strength in such important components as turntable, turntable rollers, hook shoes, A-frame, boom, and boom hoist mechanism.

Features incorporated in the Unit Mariner include double-disc clutches, automatic safety brake, large foot-controlled swing brake with positive swing lock, and an external machine-cut swing gear, which is recessed into a roller path and comparable in size to that used on a 2-yard crane-excavator. A 16-ft high A-frame permits capacity loads to be handled on an extended boom at long radius. Boom point and pendant sheaves are of ample size to insure long life of cable. All of these features are important for offshore oil platforms and tenders.

Included in the Mariner design are such standard Unit features as the main machinery enclosed in a one-piece-cast gear case insuring protection against salt spray, and the full-vision cab offering the necessary safety features.

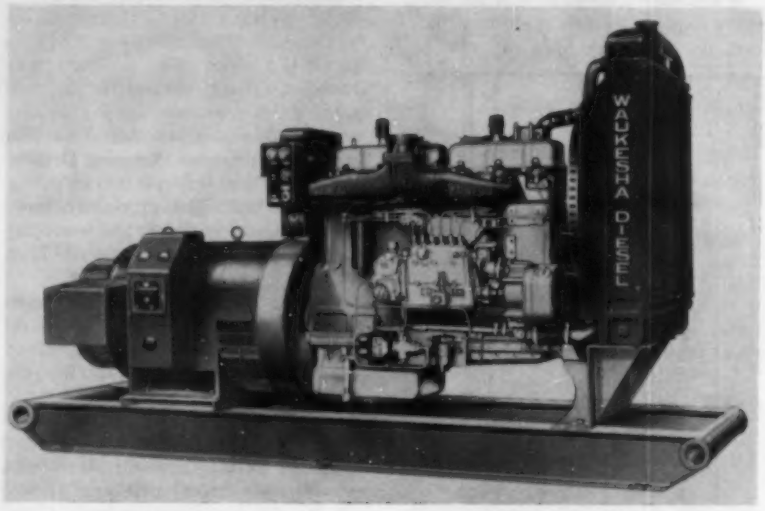
With various extensions, boom lengths are now being furnished up to 75 ft. The boom point will accommodate two load lines, one for the main hoist block and the other for lighter lifts and personnel conveyance and supplies. A cable-type boom stop is standard equipment. An additional mechanical boom stop can also be installed to control the maximum desired boom elevation.

The Unit Mariner is rated 30 tons capacity at a 12-ft radius. However, it has undergone tests by the American Bureau of Shipping as high as 10 tons at a 50-ft radius, which constituted an overload of 39 per cent of rated capacity.

Unit Mariners are now being furnished for platforms of the stationary and mobile type. There are usually two cranes for each platform and one crane for platform tenders. Net results are claimed to show dependable and economical performance aboard off-shore equipment.

Unit Crane & Shovel Corporation.

(288) New Line of Engine-Generator Units



148 Series Diesel Enginator Capacities — Kilowatts**

GENERATOR MODEL (by rpm rating)	ENGINE MODELS 148-DKU, 148-DKBU, 148-DKBSU								
	STAND-BY KW			INTERMITTENT KW			CONTINUOUS KW		
	148-DKU	148-DKBU	148-DKBSU	148-DKU	148-DKBU	148-DKBSU	148-DKU	148-DKBU	148-DKBSU
1800	*	115	150	*	100	135	*	90	120
1200	85	85	95	80	80	85	70	70	75
900	65	65	†	60	60	†	50	50	†

*148-DKU cannot be operated at 1800 rpm.
**Ratings are corrected to standard conditions 29.92 Hg. Barometer and 60F Air Temperature.
†Model 148-DKBSU not practical to operate at 900 rpm.

Waukesha's latest development is its new line of industrial engine-generator sets with capacities of from 50 to 600 kw.

The large range of Waukesha power units available permits accurately balanced engine and generator combinations in applications requiring a smooth, steady flow of power for continuous, intermittent, and stand-by duty.

Illustrated is a typical Waukesha 148-Diesel series Industrial Enginator set. The capacities table shows the ratings available with various rpm generators and for stand-by intermittent, or continuous duty. The Waukesha 148-Diesel is available as a normal diesel with standard crankshaft (148-DKU), a normal diesel with counterbalanced crank shaft (148-DKBU), or a turbosupercharged diesel with counterbalanced crankshaft (148-DKBSU).

Waukesha Enginators, both propane and diesel, for railway passenger and dining car requirements have been standard equipment on America's leading railroads for many years. Although many thousands of Waukesha engines of all sizes have been used in electric generator sets by independent builders, power packages by Waukesha are a new source of electric power for the increasing demands of modern industry.

Waukesha engine-generator sets are built for operation on gas, gasoline, or diesel fuels.

Waukesha Motor Company.

(126) Improved Metallic Lead Compound

A more finely divided lead that will remain in permanent suspension, known as Armite drill collar and tool joint compound No. 250, has been developed by Armite Laboratories.

Its anti-seize characteristics make it ideal for application to drill collars and tool joints. Being of colloidal consistency, it is easy to apply and spreads smoothly to penetrate to the extreme roots of threads.

It is claimed to be unaffected by high well temperatures, nor will it harden or oxidize.

Armite Laboratories.

(20) Turbocharged Engine

Cummins Engine announces production and commercial availability of the new 335-hp Cummins NRTO-6, Turbo diesel engine.

High output of the NRTO-6 is made possible by the use of an exclusive new exhaust gas turbocharger manufactured by Cummins. This new turbocharger designated as the T-590 plus the Cummins PT Fuel System give this engine its claimed ideal torque characteristics. The NRTO-6 develops its 335-hp at 2100 rpm, with a 90 F intake air temperature from zero to 4000 ft. It is derated 1½ per cent for each 1000 ft of altitude over 4000 ft.

Key to the high horsepower available from the NRTO-6 engine is the Cummins turbocharger. Here, normally wasted energy of the exhaust gas is used to create power. This is accomplished by piping the exhaust through a turbine, which is one element of the turbocharger. A centrifugal impeller, mounted on the same shaft, but in a separate housing, blows fresh air into the intake manifold and cylinders under pressure. More air is forced into the cylinders and a greater quantity of fuel can be burned completely.

Cummins Engine Company, Inc.

(21) Small General-Purpose Engine

A new short-stroke, air-cooled gasoline engine is now in production and is being marketed nationally by Kohler. It is designed for heavy-duty farm, construction, and industrial applications.

Designated as the K330, the new engine delivers 12.5 hp at 3200 rpm, and like other engines in the Kohler line, provides reliable power for a wide range of uses. This newest Kohler unit combines medium weight — 175 lb — with high capacity and power output.

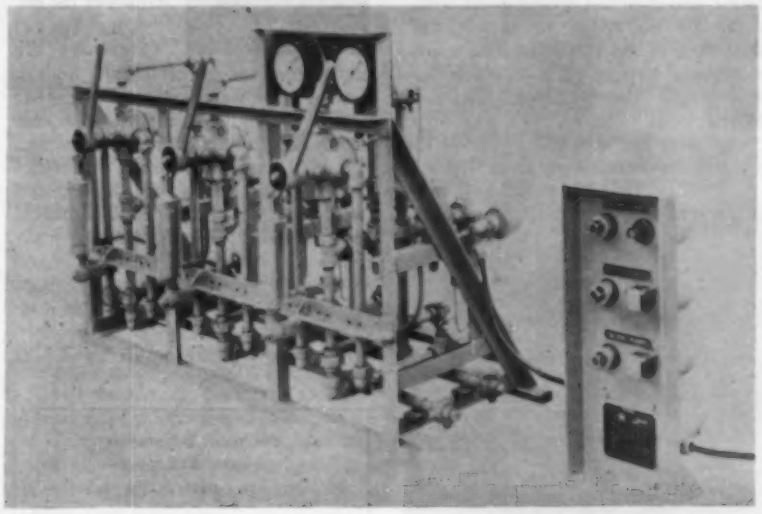
The K330 is a single cylinder, four-cycle air-cooled engine equipped with flyweight governor, oil-bath air cleaner, silencer-type muffler, fuel pump, oil pressure gage, "Eatonite" exhaust valve insert and exhaust valve rotator.

Cooling system of the new model provides a large volume of cooling air around the cylinder and head areas, maintaining correct temperatures under all operating conditions and in a wide range of locations.

The K330 produces 8.2 hp at 1800 rpm, 10.2 hp at 2400 rpm, 12.3 hp at 3000 rpm, and the peak output of 12.5 hp at 3200 rpm. Foot-pounds of torque range from 23.8 at 1800 rpm to 20.3 at 3200 rpm. The bore is 3⅝ in., the stroke 3¼ in. and the piston displacement is 33.6 cu in.

Kohler Company.

(19) Pushbutton Control of Well Pressures



When well pressure mounts to the danger point, everyone on the rig runs for safety. Nobody wants to lose precious minutes struggling with balky valves to close blowout preventers — yet the entire operation depends on closing them.

To meet situations such as this Hydril Company offers the electric control manifold with pushbutton remote closing unit for fast, easy operation of the blowout prevention control system.

With the Hydril pushbutton remote closing unit at the driller's position or at the exit stairway, the automatic pump accumulator and Hydril electric control manifold may be installed at a safe distance from the well — at the far end of the pipe rack, for instance. In an emergency, the driller simply pushes the button to shut down the well.

A pilot light beside the pushbutton tells the driller instantly whether the preventer is open or closed. In multiple-station installations, all pushbuttons except that for the primary blowout preventer are protected with swinging covers so that the wrong button cannot be pressed accidentally. As a further precaution, pushbuttons may be used only to close the equipment; to reopen, the valve on the control manifold must be operated manually.

Operating off the rig lighting service, the Hydril electric control system does not require a separate power source.

Hydril Company.

(125) Tool Joint Compound Improved with Flake Copper

Jet-Lube 21 is a double-duty compound of medium cost for drill collars, drill tubing, and tool joints.

It contains metallic lead, molydisulphide, graphite and is now fortified with flake copper.

The patented formula makes tool joints exceptionally easy to make and break. Additionally, 21 Tool Joint Compound is said to prolong tool joint life, will not wash out, and speeds up round trips. And it will not settle out or harden. This compound is said to brush on perfectly — hot or cold — and is pumpable in any type mechanical applicator.

Jet-Lube, Inc.

(27) New Trailer Mounted Hydraulic Tubing Tongs

Foster Trailer Mounted Hydraulic Tubing Tong remains on the pipe for an entire trip, thus eliminates all time lost in putting tongs on the pipe and removing them. Break-out time is reduced to 7 sec, make-up time to 5 sec. Tong is counter-balanced when installed, and is moved up and down with practically no effort, to permit the unlatching of the elevators. There are no exposed moving parts in which the crew might become entangled and injured.

The dogs are specially designed to grip any diameter tubing from 2⅜ in.

OD to 3½ in. OD, without changing dogs. Tubing marking is minimized, and inserts may be turned over for double life. An outstanding feature is that a fixed, uniform tightness can be made on every joint, by setting a special valve on the hydraulic tank for the torque desired.

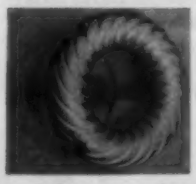
Recent modifications have increased this product's versatility, and its efficiency under extreme conditions. Two new sets of dogs have been designed as optional equipment, expanding the capacity from 1¼ in. OD pipe to 5½ in. OD casing. Also, the hydraulic pump has been enclosed in the fluid tank for quieter operation and reduced maintenance—and an air operated model has been introduced, to operate with air-equipped rigs.

The Foster Tubing Tong has a low speed of 25 rpm with a torque of 4000 ft-lb, and a high speed of 100 rpm with a torque of 1300-ft lb. The low speed is seldom needed except to break out joints. By means of a double multiple disc friction clutch the operator is able to move instantly from low speed to high speed without cutting off the power.

Foster Cathead Company.

(26) Spiral Waterway Design Increases Cleaning Efficiency

A new bit design developed by Christensen Diamond Products provides a uniform cleaning and cooling action for every diamond set in the crown of the bit.



The spiral waterways are angled to cause the circulating fluid to flow between waterways and across the face of the bit. Thus each stone is kept in constant contact with new formation.

It is recommended for use with sticky shales, softer sands, limestones, and dolomite, where proper fluid control is imperative or where cleaning has previously been a problem. The number and size of waterways as well as diamond concentration, can be altered as conditions dictate.

Christensen Diamond Products Company.

For more information on this Equipment see page E-20a

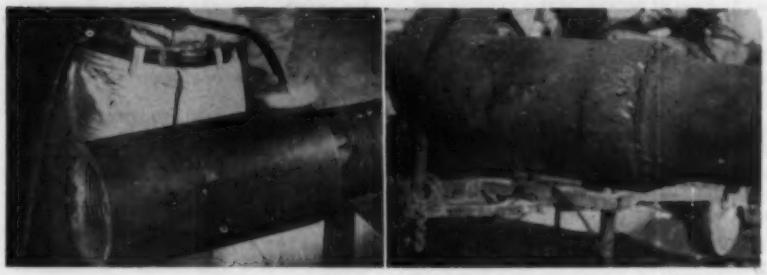
(34) Improved Rotary Shoe

Acme Oil Tool has announced its new "Diamond" Sintercut Carbide Rotary Shoe. Where drill collars are lying alongside the hole in a hard formation, this new shoe is said to improve

washover operations. When used in producing wells, the Acme "Diamond" Sintercut Shoe is used to cut over slips and loose particles of iron on or around packers and also to free stuck cable tools.

Acme Oil Tool Company.

(35) Semi-Automatic Hard-Facing of Tool Joints



Stoody's semi-automatic welding process is said to provide a very fast and economical method of tool joint hard-facing in the application of alloys other than the tungsten carbides.

In those areas in which homogenous high-alloy materials such as Coated Tube Stoodite supply the required abrasion-resistant properties, Stoody 100 (fabricated welding wire comparable to Coated Tube Stoodite) is applied by the semi-automatic welding machine.

This process offers a number of distinct advantages. First, of course, is the quality of the high-alloy deposit, which assures maximum service life for this type of material; service records of tool joints so hard-faced clearly indicate the unequaled abrasion resistance of Stoody 100. Second, the enormous saving in welding time and labor must be considered in view of the extremely high deposition rates obtained, 12 to 18 lb of metal per hour at normal welding currents, 250-300 amp. Third, since Stoody semi-automatic wires run open arc, the welder can at all times observe the work and better control metal placement.

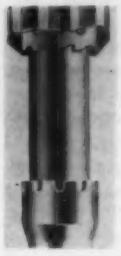
All conventional semi-automatic welders are readily adjusted to handle Stoody 7/64-in. fabricated alloy wires, of which four different analyses are currently available.

Stoody Company.

(28) Safeguard Built into Stabilizer

A safeguard of vital importance when drilling under adverse hole conditions has been engineered into the Grant Cushion Stabilizer.

This safeguard permits quickly milling off the stabilizer boots in case the string becomes stuck below the tool.



Known as the Wash-over Lock, this safety feature locks the rubber boots to the mandrel of the tool so that the standard milling shoe used to free the stuck pipe will easily mill over the rubber. If more than one boot is being run on the tool, the built-in locking means locks the boots to each other as well as to the mandrel.

With the widespread use of the Grant Cushion Stabilizer for drill collar stabilization and increased penetration, the Wash-over Lock becomes important, especially in unconsolidated formations. The inner steel sleeve of each boot carries a number of ratchet teeth around its entire circumference top and bottom. In addition, the mandrel of the stabilizer has machined lugs into which the ratchet teeth will drop.

Under normal stabilizing conditions, the boots ride up on the mandrel of the tool, acting as a bearing and centering the string in the hole. The boots do not turn in the hole. The centering action achieved cushions shock loads and lateral movement of the pipe and allows application of more weight on the bit for faster penetration rates without making crooked hole.

In the event of a stuck drilling string, the stabilizer's Wash-over Lock goes into action. The ratchet teeth on the boots fit into the machined lugs on the mandrel, preventing further independent movement. As the milling shoe rides over the boots, the boots are held rigidly in place on the mandrel. The resulting ease of washing over is obvious. Yet, when pulling up to circulate, the boots do not lock, but allow the string to run free.

Grant Oil Tool Company.

(29) Instrument Permits Recalipering

Micro-profile caliper logging of oil and gas wells has been made possible by a new type of instrument developed by Birdwell Surveys.

Features of the new instrument are continuous precision measurements and provision for re-calipering any given section in a well hole without withdrawing it for re-setting. Caliper arms can be retracted to permit lowering at any time.

The Birdwell micro-profile caliper has three hinged arms of equal length that extend outward from its case, which is 3 in. in diameter and 8 ft long. Inner ends of the arms, which are spaced 120 deg apart, are arranged to operate a selsyn motor hydraulically in such a way as to be independent of the position of the instrument in the hole and of the angle of extension of the arms. Instrument also has temperature compensation in the electrical system to assure accuracy of measurement. A selsyn motor in the recording instrument follows the sensing instrument in the well hole and provides for recording a continuous curve of hole diameters. Caliper arms of different length are provided in order to produce micrographic records of diameter measurements in holes with diameters ranging from 3 to 50 in.

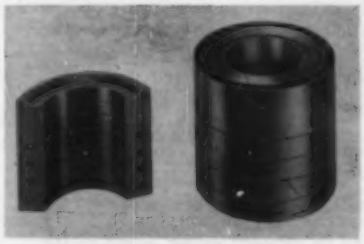
Continuous profile records of a hole have been especially valuable in locating suitable positions for packer seats when preparing for hydraulic fracturing and for computing the volumes of holes before cementing. It has also been used as an aid in interpreting electrical logs, to locate casing perforations, and to determine whether or not a casing has been ruptured. It can be used to determine the kinds of sub-surface formations that are exposed in a well hole.

Birdwell Surveys.

Mud Equipment

(38) Wildcat Slush Pump Packing

The "Wildcat" is a recently introduced Johns-Manville rod packing developed especially for oil field slush pumps. It is engineered to provide these advantages: easy installation,



effective sealing, trouble-free operation and longer life.

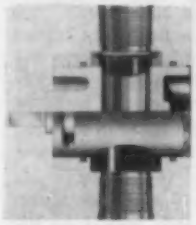
In design, this packing is a combination of solid and lip-type packings. Sets consist of header and follower rings, which are both solid, plus the required number of lip-type rings. In service, this new packing provides highly efficient sealing of the bore and rod surfaces with a minimum of rod wear and friction.

Wildcat packing is custom molded in sizes for all popular sizes of slush pump stuffing boxes. It is made of a tough but resilient composition material which is compounded to resist the abrasives and corrosives encountered in oil field mud pumping.

Johns-Manville Corp.

(40) New Mudline Valve Is Simple and Reliable

Mission Manufacturing has developed a mudline valve that is said to differ substantially from other valves currently on the market. This valve has many advantages.



The body, for example, is exceptionally short and compact, requiring a minimum of space on the line. The Mission Mudline Valve is unusually simple, having no stem threads and no bonnet studs or nuts. It is unique in that sealing takes place on the upstream side when the valve is closed, keeping line pressure out of the body.

Essentially, it is a plug valve with a cylindrical core and special pressure-actuated resilient seals located in body recesses in both ends of the valve. Since the valve is symmetrical, it may be installed with either end downstream.

Secondary "O"-ring seals fit into grooves cut in the body both above and below the line. This design eliminates the need for bonnets, stem seals and thrust bearings.

Valve has a full, round opening to minimize pressure losses and erosion. Sand and other drilled solids cannot settle out and keep the valves from closing properly.

Since only one bolt need be removed, cleaning of the valve and replacement of the seals can be accomplished quickly without removing the valve from the line.

Mission Manufacturing Company.

(39) Magnetic Mud Cleaner

The Bowen Magnetic Mud Cleaner provides a means whereby cuttings and small metal objects having magnetic attraction can be removed from the drilling mud, thus contributing materially to a longer life for the pumps and tools in the drilling string.

During milling operations, window cutting operations, etc., large quantities of metal cuttings are introduced into the drilling fluid. Because a considerable quantity of these cuttings will pass through the shaker, the Magnetic

Mud Cleaner has proved to be a particularly effective device for removing this material, the company claims. In addition to removing metal particles that will damage pumps, the cleaning action is very important when there are tools in the drilling string that have ground sealing surfaces.

This mud cleaner consists of a *base unit*, having twelve magnetic elements, and a *clean-off* unit made of a non-magnetic material. The clean-off unit is a non-magnetic shell that encases the base unit and is installed simply by lowering it over the base unit.

The Bowen Magnetic Mud Cleaner is placed in the mud ditch below the shaker and the side plates turned outward until they contact the walls of the ditch. When submerged in the mud ditch, all of the drilling mud passes through the unit.

Metal cuttings and small metal objects are attracted and adhere to the clean-off tubes of the mud cleaner.

Cleaning the unit is a very simple operation. Because the clean-off unit is made of a non-magnetic material, it is necessary simply to slide it away from the base unit by picking it up. The metal junk adhering to the clean-off tubes will then fall away. After washing, the unit is then returned to the mud ditch.

S. R. Bowen Company.

(41) De-Sander Speeds Drilling in Many Areas

Dorr-Oliver, Inc., and Salt Water Control have announced a new type of D-Sander that uses special Hycar-lined cyclones for long life and low maintenance cost.

This D-Sander was developed especially to remove from drilling mud

the excessive sand content encountered when drilling in many locations along the Texas and Louisiana Gulf Coast.

A series of controlled tests using a rig drilling six different wells in a single field showed the success of the unit. In this test, three wells were drilled using the D-Sander and three were drilled without the D-Sander. It was found that, on the average, the D-Sander saved $5712.50 per well in the Little Lake field. Largest individual saving was 57 hr in total rig time, of which 45 hr was rotating time. This saving also included savings in mud pump parts, rock bits, etc.

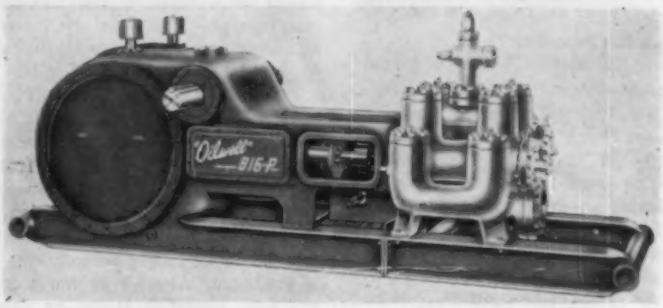
For Gulf Coast service, the D-Sander is set to remove all sand and other drilled solids over 60 microns in size.

Another unexpected application for the D-Sander has been recently encountered. Operators in Northwest Texas and Oklahoma, hard drilling areas, are now successfully using it to remove all drilled solids above 30 microns from the drilling fluid. In effect, the Dorrco D-Sander is actually a desilter when set for this application.

It was found that the D-Sander speeded drilling in these areas and also made it practical to maintain a lighter, lower viscosity drilling fluid that permitted faster drilling and longer bit life. In addition, a better filter cake was formed on the walls of the hole. Savings in these applications were large enough to pay out the unit in a relatively short time depending on the areas being drilled.

Salt Water Control, Inc.

(37) Low Weight Duplex Power Slush Pump



Oilwell's exclusive concept of power-end design*, first used with the larger, field proven 818-P, is responsible for the compactness and low weight of the new 816-P Duplex Power Slush Pump. Conservatively rated at 700 hp input, it weighs only 35,500 lb . . . less than 51 lb per horsepower. Large crankpins are mounted directly in the crankshaft in tapered bores. This outstanding engineering achievement results in shorter length (18 ft 6 in.), height (6 ft 9 in.), and width (6 ft 11¾ in.) than pumps of other designs in its class. The 816-P provides the important answer for rig operators who must have high-pressure mud service in offshore and land installations where space is limited and cumbersome weight, expensive.

To make the unit very flexible in drilling operations, eight liner sizes from 8 in. to 5½ in. are provided. Discharge pressures up to 2725 psi are possible, and volumes up to 852 gpm can be attained within pump rating.

Other features of the pump include: pinion shaft extended from both sides of the pump; a built-in system to filter the lubricating oil continuously; lightweight side covers; reliable fluid-piston rod oiling system; shim-adjustable, tapered-roller bearings on the crankshaft, pinion shaft, and crankpins; valve covers sealed with hard, molded gaskets fully enclosed in counterbores; two-piece skid construction to facilitate independent handling of fluid end when desired; one-piece fluid end with integral cylinders, valve chambers, suction and discharge manifolds and supporting feet; and screw-type glands for stuffing boxes.

Oil Well Supply Division, United States Steel Corporation.

*Patent Pending.

(42) Suction Flow Equalizer for Mud Pumps

Wilson Manufacturing claims development of the revolutionary new Suction Flow Equalizer for Mud Pumps.

The Suction Flow Equalizer consists of an upper and lower chamber, separated by a special long stroke diaphragm, made of neoprene and nylon fabric. This diaphragm is connected to a steel piston, and this is connected to a 30-in. long compression spring arranged to pull upward on the piston, while air pressure on the top of the piston presses down on the diaphragm and piston. The flow equalizer is connected to the top opening of a

tee in the suction line, *as close as possible to the pump.*

When only one piston is sucking, the suction pressure in the line from the pit decreases slightly and the spring pulls up on the piston and sealing diaphragm, storing a quantity of mud. Then when two pistons in the pump suck mud and the suction pressure increases slightly, the piston and sealing diaphragm move downward, supplying enough additional mud so that the mud flowing in the suction line from the pit can move at a constant "equalized" rate of flow, whether one or two pistons are calling for mud. It is never necessary to build up a positive pressure to slow up the rate of mud flow.

With this flow equalizer, nearly any pump can be run at a much higher speed. It will usually permit an increase in speed and increased horsepower capacity up to 50 per cent above standard rating. Thus a 400-hp pump becomes a 600- hp pump, and a 600-hp pump a 900-hp pump.

Wilson Manufacturing Company.

(43) 500-Hp Pumps Added to Line

The GX line of Gardner-Denver Mud Pumps has been increased with the addition of the 500-hp Model GXN.

This new model GXN is a 14-in. stroke pump, with 7¼-in. diameter fluid cylinders. Like other Gardner-Denver Mud Pumps, the GX has been designed with heavy-duty bronze sleeve jackshaft bearings, eccentric and crosshead pin bearings. These large bearing areas reduce unit bearing loads and are reported to give long and reliable service under the shock and high load conditions so characteristic of mud pump service. The connecting rod, as in other GX pumps, has been designed as one piece, to eliminate the possibility of bolt failure under load.

Two chain-driven positive displacement pumps, assembled in the completely enclosed power end, insure a generous supply of lubricating oil to the bearing surfaces. A packed oil-stop head and a large piston rod baffle prevent mud from entering the power end. The piston rod extension is threaded and locked in the crosshead to prevent parts from working loose.

The fluid end is designed with divided Gardner-Denver alloy iron fluid cylinders, with completely interchangeable right and left-hand cylinders. Either bolted or time-saving screwed cover plates are available. Screw gland adjustment and lantern spacers for rod lubrication are provided at the stuffing boxes. To assure an equalized flow of mud to all valves, a 10-in. flanged suction manifold is furnished. Other standard equipment includes a rod washing system complete with pump, reservoir, and all piping. Pump is mounted on a steel, oil field-type skid.

When operated at the recommended speed of 70 rpm with master size 7¼-in. liner, the GXN displaces 666 gpm and is suitable for pressure up to 1094 psi. With reduced size liners, the pump handles pressure up to 2435 lb.

Gardner-Denver Company.

Cementing Equipment

(48) New Deep Well Cement for High Temperatures

Pozmix 140 is a new deep-well cementing material that is a blend of pozzolan, lime and set-control additives. This composition is for use in wells where bottom-hole temperatures exceed 140 F.

Although it does not contain portland-type cement, it develops strengths at temperatures of 140 F or higher that will equal or exceed that of retarded cements in 24 hr. Under extremely high temperatures, Pozmix 140 maintains its strength and does not retrogress as do many other oil well cementing compositions.

Material possesses excellent pumping qualities over a temperature range from 140 to 400 F, which will correspond from 6000 to 18,000 ft and deeper in the Gulf Coast area. A versatile material, Pozmix 140 can be formulated to meet extreme conditions of depth and temperature. Evidence of this was demonstrated by its successful use at a depth exceeding 21,000 ft. Another significant property of this pozzolanic cementing material is its low rate of gellation, which reduces the possibility of flash setting down the hole in the event of unexpected shut down while displacing.

Slurry weight will vary from 13.5 to 14.2 lb per gallon under field mixing conditions. Selected weighting materials (Howco Hi Dense No. 1) can be used to increase its density to 18.0 lb per gallon yet retain the merits of long pumpability at high temperatures.

Pozmix 140 when set contains no soluble material subject to leaching by sulfate or brine waters. Tests over a period of one year show a high degree of resistance to sulfate and brine solutions.

Since its introduction to the oil industry in the middle part of 1955, Pozmix 140 has been field tested and proven under a variety of conditions and temperatures.

Standard Duriron Anode Sizes.

Curing time	Temperature F				
days	140	160	180	220	270
1	800	2885	3350	4400	4005
3	3410	4200	4285	4900	4250
7	4070	4770	4700	4825	4950
Curing pressure psi	0	0	0	3000	3000
Per cent retarder	0	0	0	0.3	0.5

	Simulated well depth–feet–API RP 10B			
Per cent retarder	8000	10,000	12,000	14,000
0.0	4:00+	4:24	1:59	1:12
0.3	4:00+	4:00+	3:15	2:15
0.5	4:00+	4:00+	4:00+	2:56
Circulating temp. F	125	144	172	206
Static temp. F	200	230	260	290

The "waiting-on-cement" time is consistent with other cements and can be drilled out or perforated in 24 hr. It has good perforating qualities and requires no special handling over conventional cementing slurries.

Unaffected by cement shortages, Pozmix 140 offers the oil industry a new deep well cementing material at a considerable saving over retarded cement.

Halliburton Oil Well Cementing Company.

(50) Weldless Stop Collar for Cementing Aids

Weatherford Oil Tool has developed a new tool that eliminates the necessity of welding slugs on casing to hold scratchers and centralizers. This new tool, the Weatherford J-2S Stop Collar, was developed to meet the demand by oil men for a welding substitute.

Tests conducted by several major companies have proved that the points of welds on casing are subject to corrosion and that leaks can easily occur at the weld points.

On high-quality steel, casing welding often decarbuerizes the metal adjacent to the weld, the intense heat causing the carbon in the steel to migrate to the surface and away from the heat through the metal. This leaves the metal near to the weld very brittle. The degree of brittleness is often in direct ratio to the

climatic temperature. In areas of cold climatic temperatures such as Wyoming, Montana, or Canada, unless the entire joint is heated prior to the welding, the metal will become brittle.

The Weatherford J-2S Stop Collar incorporates high-quality steel friction springs that fit between the tapered seat on the inside of the collar and the surface of the casing. When the stop collars are installed, the springs are wedged between the collar seat and the casing, holding the collar stationary and limiting the travel of the scratchers and centralizers.

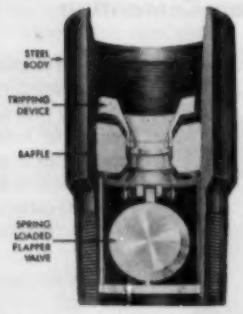
Weatherford makes these stop collars in two models. The regular model is tested tophold 5 tons, this weight being satisfactory for casing strings on wells of average depth. The other model is made of a special alloy steel and will hold weights up to 20 tons. This model is designed for use in deep-well or deviated holes.

In addition to eliminating welding, use of stop collars provides a great time saving factor since they are quickly and easily installed.

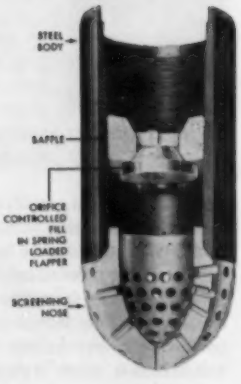
Weatherford Oil Tool Company.

(45) New, Improved Fill Shoe and Collar

The new Rector Type "O" Fill Shoe and Type "O" Fill Collar, featuring simplicity of operation, increased safety by reducing pressure surges, eliminating time-consuming manual fill, and reducing danger of sticking pipe, have been introduced.



Type "O" Fill Collar



Type "O" Fill Shoe

They are used with conventional cementing heads and plugs, and placed in the casing string in the usual manner.

The baffle and perforated nose of the Type "O" Fill Shoe are of drillable aluminum alloy. The spring-loaded flapper valve with orifice choke, in the baffle, assures controlled, constant fill. Choke diameters are engineered to meet all pipe sizes. The perforated nose serves as a fluid screen, yet assures a greater fluid passage than conventional equipment. The seat in both the collar and shoe are precision machined and ground with a rubber-covered matching valve for positive fluid seal.

Type "O" Fill Collar has an aluminum alloy baffle, spring-loaded flapper valve, and shear pin assembly for holding the valve open until tripped by application of pressure. The collar functions both as a back pressure valve and/or float collar; it can be converted to a float at any time by dropping a trip ball into the casing at the surface. Pump pressure is applied to the casing, and at 650 psi, the flapper valve is tripped shut, providing a positive closure to assure an effective float collar. The ball gravitates or is pumped out of the way into the nose of the fill shoe. If the casing is run to total depth with orifice fill, the trip ball is not used, as the seating of the cement plug on the fill collar will trip the flapper valve, which then functions as a back pressure valve.

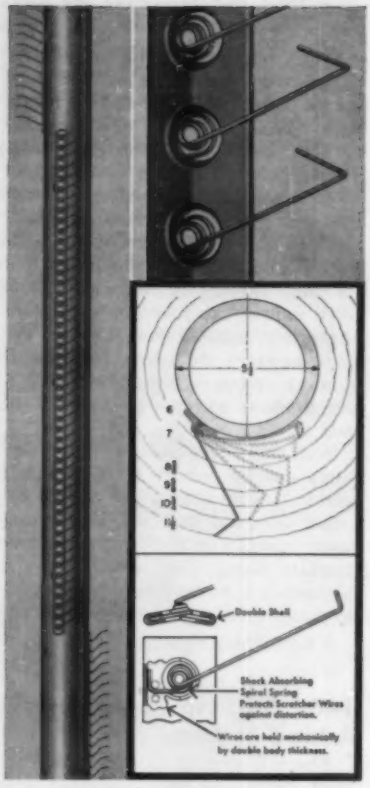
Use of Type "O" equipment is said to reduce pressure surge while running casing; to eliminate time-consuming manual fill; to insure free passage of fluid, resulting in greater volume at reduced pump pressure with higher velocity in annulus; and to permit interruption of pipe running and circulation as often and for any length of time with continued automatic fill when the running of the casing is resumed.

Rector Well Equipment Company, Inc.

(46) Rotating Wall Scratcher

For operators who prefer to remove mud cake with a "rotating" type wall scratcher, Baker Oil Tools has designed a scratcher with wires that are claimed always to present a "scratching point" to dig in and effectively remove the mud cake.

How the scratcher wires adjust to a wide range of clearances, and maintain an effective scratching point, even under slim hole conditions, is shown in the accompanying illustration. The scratcher wires of the Wall Scratcher, mounted on 5½-in. casing are said to successfully attack the wall of any hole


Double Shell
Shock Absorbing Spiral Spring Protects Scratcher Wires against distortion.
Wires are held mechanically by double body thickness.

size from approximately 6 in. to 11½ in.

Each sturdy wire is held mechanically in the double shell of the body of the scratcher, and then formed into a shock-absorbing spiral spring to prevent permanent distortion of the exposed portion of the wire.

The strong, double-shell scratcher body is readily tack-welded to the casing throughout the area to be cemented. Successive scratchers on a given joint of casing should be spaced 120 deg apart horizontally around the circumference, but mounted end to end vertically, with or without overlap, as desired.

Baker Oil Tools also manufactures a complete line of "reciprocating-type" wall scratchers, including a solid ring Slip-on type, and a hinged Hinge-Lok type, for effective "Controlled Scratching" *only* in the area to be cemented.

Baker Oil Tools, Inc.

For more information on this Equipment see page E-20a

(47) New High-Pressure Cementing Unit Developed

BJ Service has introduced a cementing unit — the 112ST, a high horsepower semi-trailer mounted pump truck. This unit is designed to develop the greater pressure and higher volumes required to meet oil well servicing problems both today and in the future.

The 112ST is powered with two 335-hp NRT Cummins supercharged diesel engines. The engines are mounted on a common base over the rear axles. Ten-speed transmission, heavy-duty drive lines, special dual-chain case, gear couplings, and chain drives to the pumps complete the power train.

Unit is equipped to use both pumps, in parallel, to displace cement slurry, fracturing fluid, acid or oil well drilling fluids. It is also designed to use one pump to mix cement slurry and to displace the slurry with the second pump.

All controls and gages necessary for operating both engines are located at a central control panel. Air controls on engine throttles and transmission provide positive action and maximum flexibility.

Two Oilwell 48PHD triplex plunger pumps convert the engine horsepower to hydraulic horsepower over the pressure range of 0 to 10,000 psi.

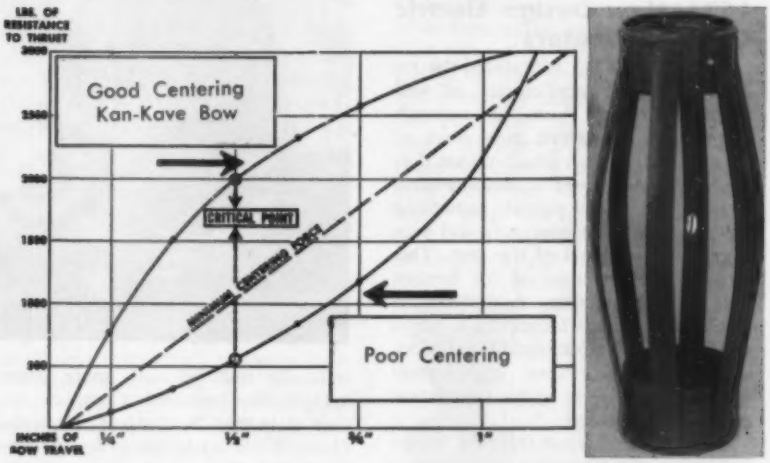
Pressure Volume Rating*

Psi	Bbl/Min.
1000	18.5
2000	9.3
3000	6.1
4000	4.6
5000	3.7
6000	3.0
7000	2.6
8000	2.3
10,000	1.1

*Capacity figures based on discharge rate at pump discharge manifold.

BJ Service, Inc.

(49) Centralizer Strength Improved



Centering of casing in the drilled hole is considered an essential element of a good cement job. The running and cementing of casing in directionally drilled offshore wells has pin-pointed the importance of this problem, and the need for strong dependable centering devices.

Ordinary centralizers made from low-carbon steel are inadequate for getting casing to bottom, and to center the casing as cement slurry is placed.

Greater strength of B and W Latch-On Centralizers results from the usage of the highest grade alloy spring steel for the Kon-Kave Bows, triple-heat treatment, and newly developed welding materials and technique for attaching the bows to the hinged-end collars.

In an extensive centralizer testing program, the maximum centralizer spacing was determined for all combinations of casing, hole sizes and hole inclinations. Also the push-down force required to run centralizers of maximum diameter, and the strength of the centralizer bows, as determined from their resistance to side thrust, was recorded for each combination of casing and hole size.

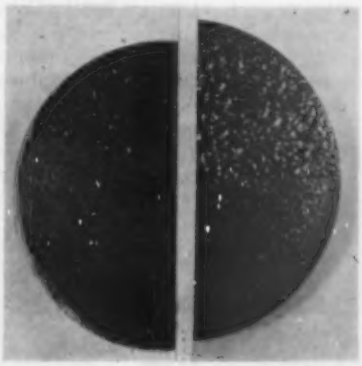
Test curves show the strength of the B and W Kon-Kave Bow design as compared with minimum requirements and a flat-bow design of low quality.

B and W, Inc.

Well Completion Equipment

(54) Oil Base Well Wash

OB well wash is an oily liquid used for well-washing. It is non-corrosive and contains no water, acids, alkalies or other ingredients harmful to personnel, equipment or formations. Wash



is 100 per cent active material and may be used as such; however, it is generally desirable for economic reasons to dilute it with a suitable oil in the proportion of 1 part OB Well Wash to 3 parts oil.

Examples of suitable oils are: (1) OB Mix Fix, (2) crude oils — these should have a fairly high gravity (30-40 F), and meet pipe line specifications (<3 per cent BS& W). Very low aniline point and high flash point of OB Mix Fix provide greater solvent action and safety than most crudes.

OB Well Wash will:

1. Completely dissolve organic residues from any source: crude oil, tars, oil base drilling fluids.
2. Release silt and cuttings by removal of the bonding material, either organic or hydrated clay.
3. Remove water by emulsification, resulting in removal of high sur-

face tension waterblock, leaving all surfaces intimately wetted by oil.

4. Dehydrate hydrated clay through emulsification and removal of the water phase, with subsequent shrinking and disintegration of the plastic clay.
5. Remove spent acid, after acidizing operations, leaving the formation oil-wet.
6. Remain completely active in brines and hard water over pH range from 1-14.
7. Disperse in brines.

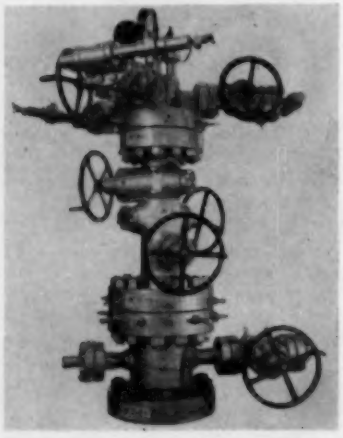
Material is completely dispersible and stable in dilute or concentrated brines if such fluids are contemplated for well-washing, particularly where the blocking material is primarily water-wet clay and silt, admixed with some oily residue. OB Well Wash is very effective for this type of blocking when added to the brine in the range of 5-10 per cent by volume; it lowers the surface tension of the brine, reduces the interfacial tension between brine and oil, and removes oil from the contact zone by dispersing it as oil-in-water emulsion.

In brief, the effectiveness of OB Well Wash is due to a combination of solvent action on organic residues, lowering surface tension of aqueous phases, and lowering of interfacial tension between the oily-washing medium and aqueous phases (free water, hydrated clay, etc.) in the material to be removed. In recent field applications well productivity has been increased by 200 per cent.

Oil Base, Inc.

(52) Parallel Tubing Triple Completion Christmas Tree

McEvoy Triple Completion Tree represents a new concept in Christmas tree design. It utilizes three parallel tubing strings, each being run and suspended independently. Tree saves tons of casing, the cost of drilling two wells, and will easily accommodate the new 2 1/16 in. tubing.



For the first time, three McEvoy valves operate independently in one compact body to control three different production zones. Each master valve controls one string of tubing without disturbing the flow of the other two. Each of these valves has two large enclosed reservoirs which store clean sealing compound for automatic feeding to the downstream sealing surfaces in response to line pressure. This automatic "gasketing" between gate and seat and between seat and body by the self-sealing system stops leaks instantly.

External lock screws allow the pack-off to be adjusted at any time during the life of the well, eliminating communication between strings. The seals around each tubing string are separate and independent from the flanged end connections. These seals can be tested to full rated pressure from outside or inside each string, or both, at any time.

The table below illustrates the various tubing sizes that may be used:

Tubing sizes that may be used in the McEvoy Triple Completion Christmas Tree:

Smallest Casing Inside Diameter	Largest Tubing sizes		
8⅝ in. — 49#	2⅜ in. X 2⅜ in.	X 2⅜ in.	
7⅝ in. — 39#	2⅜ in. X 2 1/16 in.	X 2 1/16 in.	
7⅝ in. — 39#	2⅜ in. X 1.900 in.	X 1.900 in.	
7⅝ in. — 39#	1.900 in. X 1.900 in.	X 1.900 in.	
6⅝ in. — 32#	2 1/16 in. X 2 1/16 in.	X 2 1/16 in.	

McEvoy Company

(51) New Design Electric Oil Well Heaters

Marimac Oil has announced the receipt of a new model electric oil well induction heater from its research laboratories, on which nine years of time, and more than a half million dollars have been spent in development. The present model permits something new to be offered operators and producers in a product of this sort, This heater, whether installed for bottom hole heating, or tubing, or flow line, is guaranteed against failure for a year's time, and if it is a packaged installation, using Marimac's own specification cable and engineers, entire installation is guaranteed a year.

Outside diameter of this new heater is 3½ in., and depending on the capacity, varies from 20 to 35 ft in length. It is made in stock models at approximately 10 KW, single phase, using 220-240 volts, and delivering roughly 35, 000 Btu/hr, or in three phase, 440-480 volts, approximately 30 kw, and delivering approximately 100,000 Btu/hr.

Present model of induction heater will not burn out either in air, or immersed in any fluid. It also will not generate a temperature higher than approximately 450 F in air, and when immersed in oil, approximately 325 F. This avoids carbonizing the oil surrounding unit and prevents coking up on inside of the heaters.

Heaters are offered in two designs. One is solid and intended for use at the formation face, installed on the lower end of the tubing just below the pump. Heat is reflected outward into the oil in the shot hole, and when not pumping heat tends to penetrate the formation. Other heater design is for tubing applications where the operator has difficulty with paraffin.

Unit fits in the tubing string and on flow lines and is made up of a tubing sub with the heating element built around the tube. Two-inch tubing size has a maximum OD of 3½ in.

Marimac Oil Corp.

(53) Carrot Free Shaped-Charge Perforator Developed

Plugging of perforated holes caused by carrots and charge case debris has been significantly reduced or eliminated, by newly developed shaped charge gun reported by the Lane Wells Company.

The volume of debris, normally left in the well by jet perforators, is substantially reduced and, more often, completely eliminated. Company officials state that "Karrotfree" Koneshot (Lane-Wells trade name for its new jet perforating) is the most revolutionary idea in oil well shaped-charge perforating since the introduction of jet perforating itself.

Although reports from Lane-Wells researchers do not reveal how this phenomenal feat is accomplished, they do say, simply, that the volume of debris, and carrots, fired into the hole with standard shaped-charge guns is retained

in the "Karrotfree" gun and brought to the surface.

Larger diameter holes through ⅜ in. mild steel plate and concrete have been experienced in tests conducted with "Karrotfree" and standard shaped-charge guns. Indications are that larger, cleaner holes may be expected from the new gun. The primary object is to combat successfully the plugging effect of the carrot or slug and the debris caused by charge case disintegration.

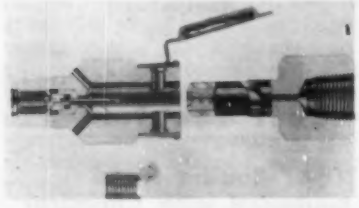
New gun is being made available as rapidly as possible and is now available to most major areas. The above picture shows two quarts of debris retained in the gun from one firing of a Lane-Wells 24-shot "Karrotfree" Koneshot gun.

Lane-Wells Company.

(57) New Christmas Tree Gage Valve and Connector

Thornhill-Craver has announced the addition of a new Christmas tree fitting to its line, the Christmas Tree Gage Valve and Connector.

According to the manufacturer, the Gage Valve and Connector is a new patented product that has not been available heretofore. It is claimed that



the Gage Valve and Connector eliminates the need, and therefore the expense, of permanently installed Christmas tree gages; that it permits the use of a single, master gage and, therefore, results in accurate and consistent pressure readings; and that by eliminating the stationary Christmas tree gages, it removes the hazard of the gages being broken off, stolen, tampered with, or damaged by exposure to the elements.

The manufacturer states that the Gage Valve and Connector has been in continuous test service on more than 100 wells for the past three years. It has proved to be entirely safe and trouble free. Unit is made of stainless steel and is tested to 30,000 psi.

Mechanical design of the Gage Valve and Connector is illustrated in the cross-section view herewith. The upper element with J-slot is attached by threaded connection to the master gage. The lower element with built-in valve is attached to the top cap or blanking plug on the Christmas tree. The lower element is installed permanently in the same manner as a pressure gage and valve are installed on a tree. A hinged cover is provided on the lower element.

To obtain a pressure reading on the well, the master gage with upper element attached is inserted in the lower element and rotated one-third turn. This slight rotation engages the J-Slot with the lower element and opens the valve, exposing the gage to well pressure. As the J-slot is disengaged by rotation in the opposite direction, well pressure automatically closes the valve in the lower element. Any pressure trapped in the body of the lower element is relieved through ports provided in the body.

On wells having pressures of less than 500 lb, a spring-actuated valve is provided.

Thornhill-Craver Company.

(59) Liner Wiper Plug Improves Liner Cementing Method

Latest addition to Baash-Ross Tool's line of liner equipment is a new liner wiper plug assembly and liner cementing method.

Use of the Baash-Ross wiper plug techniques and equipment permits the operator the same assurance of correct cement displacement and reduction in cement contamination that is presently available with the one-plug cementing method used in full-casing string cementing.

Special equipment that has been designed for these cementing operations consists of a liner wiper plug which is mounted below the tail pipe extension of the liner setting assembly, and a drill pipe wiper plug, which is designed to seat in the liner wiper plug and a special cementing head. By releasing the drill pipe wiper plug after the cement slurry, the wiper provides a barrier between the cement and the displacing fluid. When this plug reaches the liner wiper plug, the special nose piece latches the two plugs together and seals off to form a single unit. The two plugs

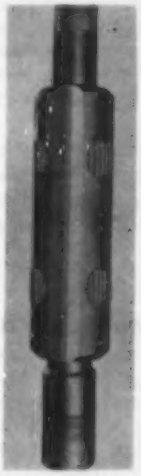
then wipe the inside of the liner until the plugs seat against the float collar in the liner string.

Two positive indications are provided to assist the operator in maintaining a record of his displacement and assure him that the assembly is functioning correctly. The first indication is received when the drill pipe wiper plug latches into the liner wiper plug. Shear pins in the liner plug assembly have been calculated to shear with from 875 to 2750 psi pump pressure, depending upon the size pins selected by the operator. Indication that the drill pipe wiper plug has engaged correctly will be observed on the cement truck gage as an immediate increase in pump pressure and a sharp drop when the pins shear. The second indication is obtained when the liner wiper plug assembly reaches the float collar. This results in a positive shut-off and in an immediate rise in pumping pressure, the same as is obtained in conventional full-casing string cementing operations.

Baash-Ross Tool Company.

(58) Hydraulic Hold-Down

The new TIW Type "HR-6" Hydraulic Hold-Down for any production-type packer has been announced by Texas Iron Works.



This Hold-Down is an improvement on the regular TIW Type "H" Hydraulic Hold-Down, which has been providing satisfactory oil field service for several years throughout the world.

The "HR-6" provides increased slip area, with six slips for greater gripping, and features three large by-pass grooves to speed running into the hole.

Tubing pressure is used to hold packer down — the higher the pressure, the tighter the grip. Slip-holding area and piston area are selected to assure positive gripping regardless of tubing pressure and casing size. The proved slip-type teeth provide positive grip with minimum damage to casing, with slips carburized for long wear.

The "HR-6" Hydraulic Hold-Down has polished piston and cylinder bores, is Parkerized throughout to prevent corrosion, and the nickel-plated springs keep slips in retracted position to prevent wear while running in the hole.

Texas Iron Works, Inc.

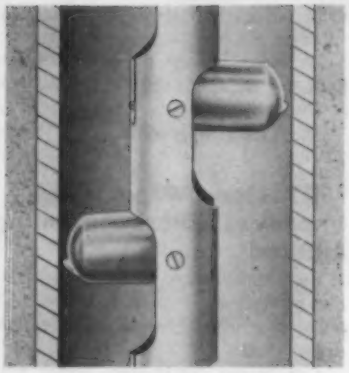
(56) 1⅜ In. Jet Gun Introduced

Welex Jet Services announces a new Swing-Jet gun for permanent type-well completions. It is 1⅜-in. OD and designed to go through small tubing restrictions, "J" nipples and 1½-in. tubing used for slim hole completions and multiple-tubing string dual completions.

The 1⅜-in. Swing-Jet is said to be equivalent to other tubing perforators and excelled only by its running mate —the Welex 1¾-in. Swing Jet.

Gun is lowered through the tubing with the charges locked into a closed position. Opposite the zone to be perforated, the charges are opened to a horizontal firing position. Opened, the OD of the gun is 3¼ in., which centralizes it in the casing to be perforated. This centralization is claimed to give assurance that all perforations are large and deep into the producing zone and spaced properly in the casing, not just on the one side as is the case with rigid-type tubing guns.

The new Welex 1⅜-in. magnetic casing collar locator is used with the 1⅜-in. Swing Jet to give positive depth correlation with packer, tubing-string bottom, and casing collars.



New Swing Jet gives more grams of explosive per charge than any other tubing gun of this size, assuring deep, clean perforations every time, according to the manufacturer. Charges are spaced at five per foot.

A recent test shot of the 1⅜-in. Swing Jet proved the tremendous power of this new tubing gun. Shooting through ⅜-in. steel and into seven-day cement, the Welex 1⅜-in. Swing Jet gave a ⅜-in. entrance hole with 9½ in. of penetration.

Welex Jet Services, Inc.

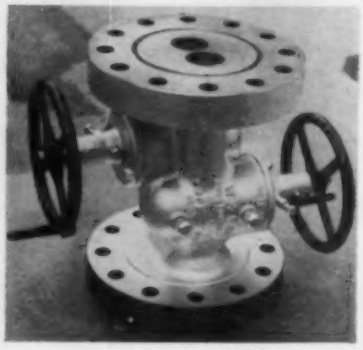
(55) New Production Valves Developed

Two new valve developments have been introduced by W-K-M Manufacturing Company. Newest valves are W-K-M's high-pressure balanced stem valve and the new dual completion valve, both of which were designed for the oil production industry.

The balanced stem valves are designed with a second stem or "balancing stem" to overcome the heavy stem loads inherent in conventional valve construction. Addition of this balancing stem, permits the heavy force created by pressure on the end of the stem to be balanced out by an equal pressure force acting on the balancing stem in the base of the valve. This equalization of force eliminates the effects of the stem load and friction in the stem threads, which reduces effort and torque required to operate the valve.

Designed primarily for high pressures, the torque required to operate valves, both opening and closing, at full rated pressure has been found to be less than on lower pressure valves of the single-stem design.

The dual completion valve is designed to permit the use of dual tubing strings in well completions in 7 in. or 8⅝ in. casing. Combination of two W-K-M through conduit valves in a special, single body eliminates the need of inferior Christmas tree designs and simplifies the tree assembly. Dual valve construction permits the same safety and positive sealing characteristics inherent in single-bore valves.



All parts in the dual valve are standard and are interchangeable with W-K-M valves of the same size.

W-K-M Manufacturing Company, Inc.

Well Servicing

(64) Tubing Head Equipped with Chemical Treatment Outlet

A chemical treatment outlet, with 2 in. LP thread, installed halfway between the side outlets and tilted upward 30 deg from horizontal, has been made available (at the purchaser's option) on the Hercules "Type E-5" Tubing Head.

This modification has been added primarily to facilitate injection of chemical pellets into the annulus of the well casing. Prior to this innovation, the pellets were introduced through one of the horizontal side outlets. This process was slow since the pellets had a tendency to jam up and not fall "free" into the annulus.

New outlet, with the plug removed and a pipe nipple screwed into place, acts as an unobstructed "chute" and permits speedy introduction of the pellets into the casing. This type of hookup is neat and compact and should lend

itself to lubricator and other liquid injection installations.

Basic tubing head, "Type E-5", is a compact well head, which is hydrostatically tested to 2000 psi. The recommended maximum working pressure is 1000 lb and the maximum recommended load is 130,000 lb. It is available in 4½ to 5½ in. casing sizes and is designed to suspend 2 in., 2½ in. and 3 in. tubing. Construction is pressure cast steel.

A tubing stripper unit (not illustrated) is also available that may be screwed into the cap thread of the head. Hercules Neoprene Tubing Stripper Rubber is used in this unit.

Hercules Tool Company.

(62) Truck Powered Units for Well Servicing to 10,000 Ft

Cooper Model TR units, available in a wide range of sizes, are of the latest design, stressing simplicity of operation, maintenance and with fewer working parts.

Rugged power transfer arrangement features constant mesh helical oil bath gears with torque tube drive to the equally rugged winch countershaft. This provides quiet running, eliminates the adjustments necessary in other designs and eliminates high speed chains with their necessary guards. It also reduces weight without sacrificing strength.

Cooper design permits simple and correct location of the drums for the proper weight distribution to provide ease of handling in the field and the right axle loadings to meet highway regulations.

Truck bed, winch, complete drive including power transfer mechanism are built together as a single unit, which eliminates much of the strain from the truck frame and makes it quickly removable for the most economical remounting cost on any other standard truck.

All winch operating controls, including the truck clutch and transmission gear shift are handled at the operator's position, which may be either from platform or ground. The drum clutches are self-adjusting, full air friction, each having ample capacity for maximum line pulls with clutch lining life.

Simplified maintenance, sealed bearings are used where possible, and grease fittings are located on exterior of frame for easy access. Units are available with complete auxiliary equipment, including single and double drum models, single or twin pole pipe mast or telescoping derrick and rotary drive.

Fred E. Cooper, Inc.

(65) Permanent Completion Put into Service

3-in-1 Permanent Well Completions recently announced the purchase of a new-type packaged mobile unit for servicing wells equipped for permanent completions.

The truck-mounted rig combines three essential well completion services on one mobile unit . . . cementing, perforating, and wire line services. These operations can be performed by a single company with the same rig without removing the tubing, thus reducing well completion and workover costs, fully coordinating all services.

After its initial demonstration in Dallas, Texas, the rig will go into operation in South Louisiana, based at Houma. Dan McCarty, president of 3-in-1 Permanent Well Completions, stands beside the new packaged rig.

3-in-1 Permanent Well Completions, Inc.

(63) New Chemical Tubing Cutter

McCullough's Chemical Tubing Cutter is claimed to be one of the newest and most important advances in specialized service tools for the oil industry. New tubing cutter utilizes the tremendous energy of a liquefied compound of fluorine, under closely controlled conditions, to cut oil well tubing in a split-second at any depth.

Chemical is contained in a heavy-walled cylinder. A pressurizing chamber is attached at the upper end, while a special firing head with appropriately spaced orifices is mounted at the lower

end. The assembly, lowered into the well on the electric wire line is positioned at the predetermined cutting point and held secure against the powerful cutting thrust by a specially designed slip arrangement. Upon electrical impulse the force from the pressurizing chamber drives the chemical into the cutting head where the chemical is triggered into high-speed reaction. The chemical jets from the orifices in the cutting head under high pressure and cuts the tubing in a fraction of a second, making a smooth, clean cut.

There is no flare on either the OD or ID of tubing cut by this cutter. Also, the operation is entirely junk free, since no part of the cutter is expendable. Tool is removed from the well intact after the cut is made. It is estimated that the cutter will save as much as 80 per cent rig time compared to other cutting methods.

The design of the cutting head so closely controls the chemical cutting

action that the casing is not damaged in the slightest. It is now available in most service areas in two sizes: 1¾-in. OD for 2 in. tubing and 2⅛-in. OD for 2½-in. tubing. It is also available in these sizes for perforating tubing for circulation.

Considerable use has been made of this tool as a means of opening up tail pipe below a packer. For example: cutting off bull plugs, pins, perforated tubing, slotted tubing, etc., so that tools can be run-through for permanent type well completion operations. Other chemical cutting tools are now being perfected to cover the entire range of cutting operations, perforating, specialized fishing jobs and even drilling.

McCullough Tool Company.

(61) Electronic Pressure Recorder for Well Treatments

Safety, accuracy, and reliability are said to be greatly improved with the electronic pressure recorder used by Western in its fracturing and acidizing operations. The electronic recorder also provides a permanent visual and simultaneous record of both casing and tubing pressures throughout well treatments.

Operation of the recorder is basically quite simple. With the dual recorder mounted in the service engineer's auto, insulated electric lines are run from the recorder to the wellhead. The pressure-detecting devices, "transducers," are installed in the treating lines immediately at the wellhead. Fluid pressures in the treating lines are exerted against floating pistons in the transducers, and as the pistons move under pressure, they activate specially designed bourdon tubes. Action of the tubes causes variations in the electronic circuit in direct proportion to changes in pressures at the wellhead.

Varying amounts of current operate the recorders in the automobile, making a permanent record on chart paper of all variations in pressures throughout treatment.

Recorder operates from the automobile's electrical system and requires no special generators as the amount of electrical current needed is minute. Even a direct short will not cause a spark or other fire hazard. Operational safety is greatly improved because the recorder may be located up to 200 ft from the wellhead — well beyond the high-pressure hazard area.

Western's recorder has a range of 0 to 10,000 psi, calibrated to a tolerance of plus or minus 2 per cent at full scale deflection. An accurate reading of pressure at the wellhead is secured and the false picture caused by taking pressure readings in the treating lines near the pump units is eliminated. The system is so sensitive as to record the shifting of gears in one pumper on a five-pump treatment.

Reliability is improved since the pressure hoses to the gage box are eliminated. Likelihood that unreliable readings may be caused by pressure hoses being blocked by sand, gels, emulsions, or foreign matter is removed.

The Western Company.

Artificial Lift

(74) Special Corrosion-Resisting Coating Used on Pumps

For highly corrosive wells, Reda Pumps are now available with a special corrosion-resisting coating.

It is a combination phenolic, epoxy-catalytic, setting-type resin, which has been very successfully used in wells where corrosion is a serious problem. Several catalytic setting-type resins were tried by the company, but none were as successful as the combination phenolic, epoxy resin, which is now available. This resin is very resistant to hydrogen sulphide. It has been found to be particularly effective in wells producing from the Arbuckle formation.

Application is comparatively simple. The entire unit is first cleaned by shot-blasting. Successive coats .003 in. thick of the special resin are sprayed on until a coating of .015 in. is obtained. The result is a tough, hard finish that successfully resists corrosion attack.

Reda Pump Company.

(75) Company Develops Long-Life Pump Valve

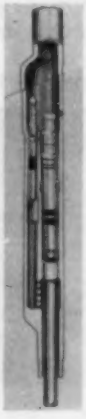
Sargent Engineering has developed an extra long-life valve that is said to be extremely resistant to sand-cutting, fluid-cutting, corrosion, shock and wear. This Sargent Seco-Supreme Valve is made to API specifications of the hardest, most wear-resistant steel alloy developed during the past 36 years of building oil well pumps.

In field tests by leading oil producers, under extreme well conditions, Seco-Supreme Valves have outperformed conventional valves from 2 to 20 times, according to the manufacturer. This is extremely important when the average cost of pulling a pump to replace valves runs to approximately $200.

Sargent Engineering Corporation.

(66) New Wire Line, Gas-Lift Valve and Seating Tool Developed

A new mandrel for permanent-type well completions incorporates a standard side-pocket mandrel and two tubing landing nipples into one unit.



The PC Mandrel manufactured by Camco, Inc., is designed with tubing landing and sealing nipples adjacent and parallel to the side pocket receiver section. Thus, gas-lift valves, dummy valves, chemical-injector valves, and circulating valves may be seated in the side pocket, and extension hangers, tubing blanking plugs, etc., may be landed in the contingent tubing nipple.

Extension pipe is suspended from the hanger for washing sand or performing squeeze cementing operations. A dummy blanking valve seated in the side pocket above entrance ports from

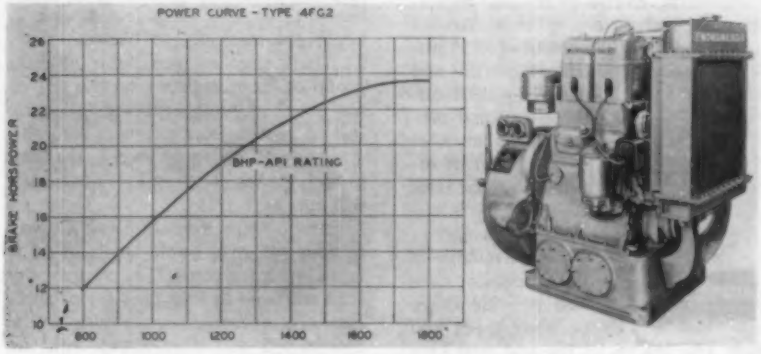
the casing annulus directs the circulation of fluid from the casing annulus through the side pocket and around the extension pipe. With the dummy valve and extension hanger removed and a blanking plug or check valve seated in the lower tubing nipple and sealed below the circulating ports, fluid can be circulated from the casing annulus to the tubing without allowing pressure on the producing formation.

The mandrel provides an excellent means for killing a high-pressure well without pumping into the formation. A blanking plug can be seated in the tubing receiver nipple and sealed above and below the circulating ports and the tubing filled with fluid. A dummy blanking valve is removed from the side pocket and the well is circulated and killed without mudding the formation. The mandrel may be used for gas lifting or chemical injection with valves installed in the side pocket and with the parallel tubing nipple empty.

Perforating guns, pressure bombs, and other wire-line tools will pass through the mandrel, which has a minimum tubing diameter of 1 13/16 in.

Camco, Inc.

(76) Gas Engine Designed for Pumping Units



Addition of a two-cylinder gas engine to its Power Chief ® series of small diesel and gas prime movers is announced by Nordberg. Now in production Model 4FG2 extends the horsepower range of Nordberg's Power Chief gas engines for oil field pumping service.

New model has an API rating of 12-24 hp at 800-1800 rpm. It is equipped with a combination gas-gasoline carburetor and a gas pressure regulator. Safety shut-down controls for low oil pressure/high water temperature are also standard equipment. Additional features which make this engine the safest on the market are an enclosed clutch, enclosed flywheel and fan.

With a bore of 4½ in. and a 5¼ in. stroke, this four-cycle engine has a piston displacement of 167 cu in. The compression ratio is 6:1. The radiator is large enough to assure trouble-free operation at ambient temperatures up to 125 F.

Units are designed to give reliable service under the most rugged operational conditions and are built to the same exacting standards as the larger Nordberg engines. Heavy-duty construction insures a long life with only periodic preventive maintenance inspections.

Nordberg Manufacturing Company.

(72) New Junior-Size Hydraulic Pumping Unit

Newest addition to the Axelson line of hydraulic pumping units is the four-foot stroke Junior Hydrax, capable of handling an 8000 lb upstroke load. Primarily it was developed for "stripper" applications or wells where production requirements are 50 B/D or less.

Unit is designed for adaptation directly to the wellhead without the necessity of an elaborate and expensive foundation. Reservoir unit may be located at any reasonable distance from the well.

The unit is pedestal mounted for adaptation to the wellhead tubing. A unit polished rod couples to the well polished rod, which effectively eliminates the possibility of crude oil contaminating the hydraulic circuit. An oil saver stuffing box, utilizing vacuum developed on the downstroke, successfully eliminates leakage of hydraulic oil.

A simple external adjustment on the Axelson four-way valve will provide any downstroke time ranging from a minimum of two seconds. Upstroke time will depend on the speed of the power pump. A relief valve is incorporated in the circuit to alleviate the possibility of harmful extraneous loads.

Upstroke. Power fluid is ported through a four-way valve to the underside of the working piston. The piston is displaced upward four feet, uncovering a port that telegraphs pressure to

the pilot valve. The pilot valve is repositioned, which vents one end of the four-way valve and positions it for the downstroke.

Downstroke. Repositioning of the four-way valve ports pump and cylinder discharge to the reservoir. The working piston thus begins the downstroke. After traversing four feet, lower cylinder port is vented, again repositioning the four-way valve and blocking both cylinder and pump discharge to the reservoir. The pump then provides fluid to the piston for the upstroke.

Axelson Manufacturing Company.

(73) Oil Well Pumping Control

The Nelson Class 500 Oil Well Pumping Control offers a number of improved features that provide maximum flexibility of control, maximum protection for electric motors, and maximum safety for operating personnel.

Control flexibility is achieved by means of *plug-in-type* components that

make it possible to change restarting characteristics in the field. The plug-in time switch is optional and has permanently installed dial trippers allowing "on" or "off" periods of 15 min duration.

The plug-in hand-reset undervoltage relay can be added to require manual restarting after voltage failure. Or, a plug-in undervoltage relay with sequence restarting can be furnished for automatic, staggered restarting. When a time switch is not required, a plug-in start-stop pushbutton station can be used.

This pumping control is available with fused switch or air circuit breaker. Safety to personnel is assured by having all live parts covered with doors that are interlocked with main switch. Safe, dead-front construction is utilized. The gasketed, sheet metal enclosure is dust-tight. Overload relays are located in a separate, ventilated compartment to prevent false tripping due to excess atmospheric heat. A three-phase lightning arrestor is furnished with each unit; three single-phase arrestors are available as well as a surge capacitor. Provision is made for mounting a meter socket, plug-in watt-hour meter, Nelson pump-off recorder, or other test device. A control transformer (dual-voltage primary) is furnished where 110 v is desired on the control circuit and accessories.

The Nelson Oil Well Pumping Control is offered in NEMA sizes 1 through 4 with each unit drilled for all switch and fuse sizes necessary to adapt it to 220 or 440-v service.

Nelson Electric Manufacturing Company.

(71) New Pumping Unit Added to Line

Another model is added to the expanding line of pumping units offered by Alten. New unit is designated the A-5F-25.

Although previous additions have been chiefly larger capacity units (Alten units now range to 320,000 in.-lb API) this new A-5F-25 model has a unit structure rating of 5000 lb-25,-000-in.-lb peak torque gear reducer. However, it incorporates a combination of numerous features not previously available in units of this rating.

It is a floor clearing unit with the further advantage of being beam and crank balanced. For medium-shallow wells, unit fills the need for a unit that may be either skid mounted for semi-permanent installations or permanently installed on a solid foundation. The all-welded portable skid base illustrated is available as optional equipment with this and other Alten units. — It is jig drilled for easy mounting and solidly built to provide adequate support and solves the principal problems involved when quick, easy movement is desired.

Additional characteristics include: Bronze bushed saddle bearings, case hardened gear reducer, automotive type service brake, adjustable horsehead that swings back for easy well service, and numerous other construction features. Special adaptations of the A-5F-25 and other Alten models are available.

Alten Foundry and Machine Works.

Instrumentation Control

(267) Electric-Hydraulic Motor Valves

Powerful electro-hydraulic, motor-operated valves for efficient remote control of all industrial liquids and gases — shut-off, three-way and proportioning control — are manufactured by General Controls.

Hydramotor Valves, available in three operator sizes and in wide range of body types and sizes (⅜ ips to 12 ips and operating pressures up to 6000 psi) are employed in a wide group of applications. Integral electric motor-operated hydraulic pump drives spring-loaded piston to operate valve; opened circuit or power failure allows spring to return valve to normal position. Featuring fail-safe operation and two-wire control, time-tested Hydramotor Valves provide a safe, dependable and durable answer to all liquid transfer problems.

General Controls Company.

(84) Digital Supervisory Control

A new remote tank gaging system, one of the Bendix Electro-Span systems, is now being produced by Pacific Division, Bendix Aviation. The equipment is finding a wide number of applications in petroleum and process industries.

This simplified, digital gaging system remotely measures liquid levels in tank farms of any size over a single wire-pair of any length leading to the tank farm area. Operator of the tank gage receiver selects the tank he wishes to measure, causing the selected tank to begin automatically to transmit data. The tank number then lights up in a group of lamp registers on the left of the panel. Almost instantly following this, in light register groups to the right, a reading of the liquid level in the tank in feet, inches and fractions of an inch will appear.

Electro-Span Remote Tank Gaging System will read liquid levels to 64 ft in ⅛-in. increments. The system will read and hold or scan tank farms automatically. Average temperature can be determined and transmitted with the liquid level information. Cyclic timers can be used also to make readings at pre-selected times.

Coding is such that recorded readings may be made into a low-cost electric typewriter or on punched cards.

Electro-Span systems can be set up to have remote receivers in several locations. Receivers might, for example, be installed in the field office, accounting department, and in the pipelining scheduling office.

Pacific Division, Bendix Aviation Corporation.

(281) Gas Flow Computer Involves New Principle for Solving Flow Equation

Librascope announces an addition to its extensive line of products, the Librascope Flow Computer, an instrument of unique design, based on a new principle for continuously solving the flow equation of gases.

This computer will reduce and possibly replace the need for charts in the orifice metering of gas. The device is

mechanical, clock-meter driven (electrical, pneumatic, or hand-wound), and may be installed in the instrument-case of an existing meter installation or obtained complete with pressure elements. The same type of pressure elements that actuate the pen arms will serve as inputs to the computer. Torque required for the computer is the same as for the pen arms.

Unit continuously computes the extension factor in the flow equation and totalizes the result on a mechanical counter, or provides a switch closure for an electrical pulse input. The totalizing is continuous over a differential or static pressure of 40:1 with an overall accuracy of better than 1 per cent.

One of the unique features of the computer is the low force required for its operation. A standard electric clock motor will drive the counter at 30 rpm, which corresponds to 18,000 counts per hour.

The mechanical circuit consists of a clock motor that drives a counter through a gear train and two double-disc integrators connected in series.

Input value is indicated on a dial calibrated in the same manner as a square root chart. The square root of the input value is generated by the combined action of the linkage and double discs.

Output is displayed on a counter, or may be transmitted by electrical impulses provided by a built-in switch.

An optional feature is a pulse output provision that makes it possible to operate a remote electric counter or to feed the computer output into a data processing system.

Librascope, Inc.

(279) Direct-Reading Flow Indicating System

Instantaneous indication of gas flow in standard cubic feet per minute, computed according to the American Gas Association orifice meter equation and corrected for temperature, pressure, and other variables, is the outstanding feature of the Model DRF Direct-Reading Flow Indicating System manufactured by Southwestern Industrial Electronics.

Continuous integration and totalizing is an optional feature of this system, with digital readout in standard cubic feet. Provision is made for telemetering both analog flow rate and digital integrated data, while strip charts and automatic printing counters can be used to provide permanent records.

The DRF system is electronic in operation but uses no vacuum tubes, as computation is performed by stable, reliable magnetic amplifiers. This technique is said to produce better accuracy, wider dynamic range, and higher frequency response than conventional mechanical systems.

Equipment is packaged for installation in hazardous locations or exposed to the weather, as well as for in-plant use. The flowmeter can be applied to gas transmission pipe lines, process plants, and oil and gas production, especially offshore. A small amount of 110-v, 60-cps, a-c power is required to operate the system, but it need not be regulated with regard to either voltage or frequency, and momentary interruptions will not affect the output. A plug-in unit allows the range to be changed to handle different orifice sizes without affecting the direct-reading feature.

The photograph shows three of the basic units of the system: the power supply at the bottom (the tube-like devices are thermal relays, not vacuum tubes); the computing unit in the middle, with the reference voltage standard cell on the door; and the integrator at the top, with the manual compensation adjustment for temperature, specific gravity, Reynolds number, expansion factor, and supercompressibility factor at the left (temperature and specific gravity compensation may be automatic if desired. The plug-in range adapter and digital, volume indicator are also on the top panel. The only necessary items, in addition to those shown, are the static and differential pressure transducers; a flow recorder or indicator is optional.

Southwestern Industrial Electronics Company, Inc.

(85) Redesigned Pressure Transmitter

A redesigned, low-cost, pneumatic pressure transmitter is available from Conoflow.

Operating on the force-balance principle, the Model "P" pressure transmitter, a lightweight, rugged, yet highly sensitive unit, is ideal for services involving viscous substances, or materials that solidify in the static lines of bourdon tubes. It also has wide application for liquid level indication on open tanks containing viscous materials or those with solids in suspension.

Model "P" is unique in that it utilizes simple, flat diaphragms in lieu of bellows. This eliminates the problem of viscous materials hardening in bellows convolutions. Diaphragm material is of rubber, Teflon, or stainless steel, depending on the temperature range and corrosiveness of the service. The supersensitive pilot is completely isolated from the pressure diaphragm so that controlled gas or liquid cannot back up into air lines in event of diaphragm failure.

Conoflow Corporation.

(82) High-Pressure Safety-Relief Valves

Anderson, Greenwood & Company has expanded its Type I Precision Safety-Relief Valve line and can now furnish all series with pop pressure settings as low as 100 psi and as high as 10,000 psi.

Newest model is shown and is available with inlet sizes up to 1¼ in. NPT The entire line is ASME approved and capacities are certified by the national board.

Exclusive soft-seat design on the sealing disc has been modified slightly, but still retains its bubble tight reseating qualities even after many cycles of operations.

This plastic disc seals both by forming itself perfectly to the polished nozzle surface and by O-ring type action in the corner formed where the nozzle and retainer laps.

While the valve trim is always stainless steel, all valve bodies are now available in cadmium-plated carbon steel for applications where stainless steel bodies are not required.

Anderson, Greenwood & Company.

(86) Graphic Electronic Recorders

A new line of recording millivoltmeters and microammeters has been announced by the industrial controls division, Manning, Maxwell & Moore.

With a measuring element that is over 50,000 times more powerful than conventional direct-deflection movements, the pen-drive mechanism has ample power to operate alarm contacts with no loss of accuracy.

This new "American-Microsen"

Series 130 Electronic Recorder is designed in the "graphic" style, recording on a 3-in. wide chart while using panel space of less than 25 sq in. Both continuous strip charts and IBM-type card charts are available. Recording is on straight-line coordinates.

Series 130 Recorder measures input signals with a unique electro-mechanical transducer and amplifier that drives a powerful rotary solenoid to position the pen. A feedback spring from the pen arm to the input transducer force balances the pen position in precise relationship with the input signal. Resulting power eliminates the usual limitations of low-level electrical measurements, such as pivot friction errors, vibration effects, and excessive maintenance.

The recorder is available, as a microammeter, in ranges from 0-200 microamperes to 0-100 milliamperes. As a millivoltmeter, it is available in ranges from 0-20 mv to 0-100 v with input sensitivity to 6700 ohms per volt. Accuracy is within 0.5 per cent of the range. Repeatability is better than 0.25 per cent of range. Recorder responds to input changes of less than 0.2 per cent of range.

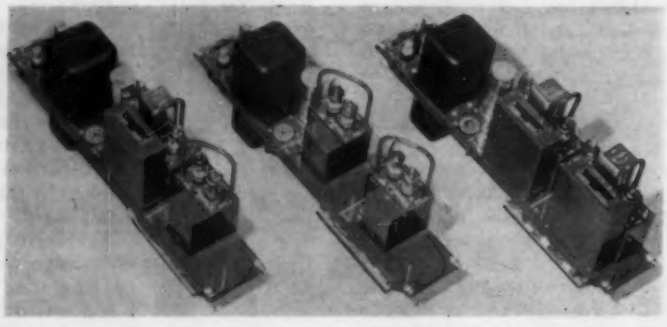
Speed of response is 0.5 sec for 63 per cent of a step change. On special order, response speeds up to 0.2 sec for 63 per cent can be furnished. A switch is incorporated in the recorder to increase this response time by a factor of four in order to damp out unwanted fluctuations.

Recorder can be furnished with single high or low, or high and low alarm contacts.

If desired, the recording mechanism can be omitted when a rugged, positive contact-making meter is required.

Manning, Maxwell & Moore, Inc.

(81) Low-Cost Remote Control Centralizes Operations



More efficient operation through centralized operations control may now be realized through the use of low-cost, dependable Hammarlund audio tone units.

Through the use of Hammarlund COC equipment, both control and indication are possible from a central point. COC makes possible the operation of motorized valves, pumps, and any other mechanized equipment, as well as remote telemetering. The unique feature of the Hammarlund equipment is the fact that all communications from the control point to the operations points may be carried on a single, ordinary pair of telephone wires through the local telephone system. Up to 22 various functions may be performed over the same telephone wire.

Principle employed is simple, dependable and very efficient. COC equipment is installed at both ends of the communications line. To actuate a function at the receiving end, the unit at the sending end merely sends out an audio tone of pre-determined frequency. At the receiving end this tone is picked up by the receiver which in turn actuates a relay controlling the desired equipment. Where more than one function is desired over a single pair of telephone wires, the frequency of the tone is interpreted by the receiver and channeled to the proper relay.

In most cases, COC equipment may be used with present telemetering and control equipment, thus making possible a complete remote control system at very low cost.

The distance over which equipment may be operated on telephone wires is practically unlimited. Anywhere you can telephone, you can have remote control. Where there are no telephone lines available, equipment may be employed with radio links connecting the points in the system.

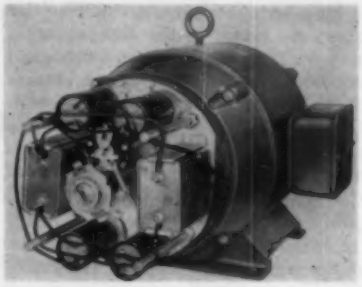
Used over a number of years by large water systems, sewer systems, refineries, railroads, and process industries, COC equipment is today offered as packaged, ready-to-operate units.

Hammarlund Manufacturing Company, Inc.

(90) Electric Motor for Field Conditions

Three new motors — two rated at 10 hp and one at 15 hp — have been engineered by Robbins & Myers and added to its full line of All-Weather, capacitor, single-phase motors.

Full-scale production of the new models, which are claimed to be completely protected against the weather, debris, and small field animals, is underway at Robbins & Myers' motor division in Springfield, Ohio.



The new high torque, capacitor-start, capacitor-run motors are available in 1725 and 1140 rpm speeds. They are especially suited for use in the oil country, farm equipment manufacture, and small industry as well as on farms, in applications requiring more than 7½ hp on single-phase operation.

These new All-Weather motors have these features:

1. Rodent-proof housing. Screens in the endhead openings seal the motors against entry of large objects of every kind.

2. External mounting of condensers and centrifugal switch mechanism in weather-proof covers, which yields quick and easy inspection even while the motor is operating.

3. Ball bearings, pre-lubricated to operate for years without re-lubricating, are sealed against grain dust and other foreign matter.

4. All steel parts are protected by a special moisture and rust-resistant undercoating.

5. Rust-inhibited rotors, shaft, and fan.

6. Cast iron terminal box is gasketed and power leadins are sealed in the motor shell.

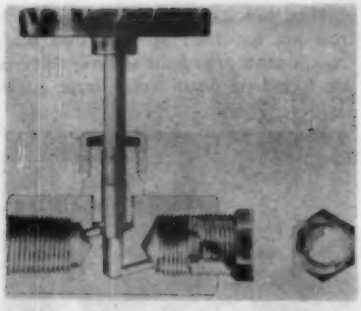
Robbins & Myers, Inc.

(83) Redesigned Gage Dampener

A redesigned pulsation dampener that is said to control fluctuations on pressure gages and controls to an absolute minimum is announced by Frank W. Murphy,

Varying conditions of pumping that include pulsing variations greatly affect wear on gages.

This dampener completely controls,



it is claimed, such variations by micrometer adjustments. Large 2⅞-in. diam handle makes adjustments easy, and operating instructions are etched on a brass plate on the handle for easy reading. A porous metal filter-strainer prevents foreign particles from entering the valve body. Strainer is easily removed for cleaning.

Frank W. Murphy, Manufacturer.

(280) Private Line Two-Way Radio Eliminates Channel Chatter

Motorola's Private Line radio utilizes an entirely new circuitry concept to eliminate the constant stream of channel chatter over the loudspeaker and to assure maximum communications range.

These Private Line receivers are completely quiet except when receiving a call from another Private Line radio in the same operation. Nuisance noise, messages from nearby systems on the same channel, and skip interference from distant systems are not heard. Elimination of extraneous interference reduces errors from missed and misunderstood messages, increasing overall efficiency. Tension and fatigue are also reduced — radio operators hear only messages intended for them.

Unlike a conventional tone-pulse selective calling system, Private Line radio employs a continuous, inaudible,

subcarrier tone on the transmitted carrier, which operates an exclusive "coded squelch" circuit (patent pending) in the receiver. Interfering signals cannot "trip open" or "lock in" the speaker since continuous presence of the properly coded carrier is required to keep the speaker unmuted. Peak squelch sensitivity is automatically and electronically maintained at all times, assuring extended communications range. Elimination of the traditional squelch control prevents desensitization of the receiver by careless or intentional misadjustment.

There are no additional buttons, lights, adjustments, or operational techniques involved. Elimination of squelch adjustments makes Private Line radio even simpler to operate than conventional equipment. A wide choice of mobile and base station models is available in the 25 to 54 and 144 to 174 mc frequency bands.

Motorola Communications & Electronics, Inc., subsidiary of Motorola, Inc.

For more information on this Equipment see page E-20a

6 ways better

flow control

An entire lease is controlled accurately and precisely in minutes through this battery of Willis Rotary Adjustable Chokes.

PROVIDES 6 different sized choke inserts which are individually positioned in the line of flow by a fractional turn of the orifice-carrying disc . . . under constant flow and high pressure.

The 6 graduated orifices are changed to a new range in minutes... without shutting-in the well.

A positive shut-in is made by inserting a blank orifice.

WILLIS *Rotary Adjustable* CHOKES

WILLIS OIL TOOL COMPANY

3440 Pine Ave., Long Beach 7, California

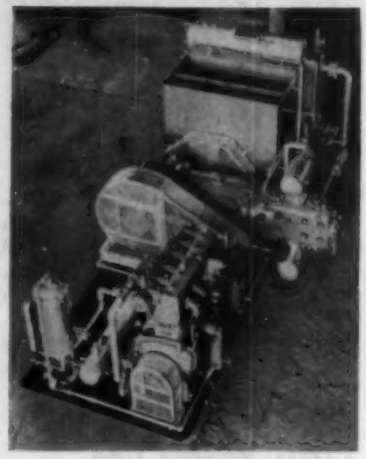
Houston: 2012 Taft Street Odessa: 100 N. Texas Street

(96) Small Package Compressors Built

Southwest Industries has completed its line of packaged gas compressors with new models for under 250 hp. These new units are not stripped-down versions of larger integral packaged compressors, but are designed and built with the same thoroughness as the larger packaged plants.

The FMP Cooper-Bessemer compressor is the same type as is used on larger plants, and is interchangeable with them. Liners on the cylinders are interchangeable. The heavy-duty, slow-speed (300 rpm) compressor gives the stamina needed for continuous operation. Any drive, electric, diesel, etc., can be used through the heavy-duty, poly V-belt drive. The completely enclosed frame and oversize bearings are other examples of traditional Cooper-Bessemer quality. Frame capacity of 300 hp is evidence of ruggedness.

Engine, compressor, scrubbers, cooling and lubricating systems, and controls are mounted on a floored skid. Components are of the same quality as are found on Southwest's large packaged plants. The same vertical air discharge cooling is used as in integral, packaged gas compressor plants. Ample pulsation volume bottles — not a direct connection from scrubber to cylinder — is one example of the care taken in engineering these new low-horsepower units.



Southwest Industries, Inc.

ROCKFORD

This is the Clutch that the nations largest manufacturers of heavy-duty machines are showing as a NEW feature

*TRADE MARK

"MORLIFE clutch has gone 851 hours without slipping or adjustment."

"MORLIFE clutch going strong after 1693 hours, working in sand."

"MORLIFE clutches last 950 hours longer, without adjustment."

"MORLIFE clutch needs adjustment once a month, instead of daily."

"MORLIFE requires lighter handle pull and one tenth the adjustments."

"MORLIFE pulls harder and lasts six to ten times longer."

"Won't buy a unit that isn't equipped with Durable MORLIFE clutch."

New MORLIFE* CLUTCHES and CLUTCH PLATES Give—

MORE Clutch Life (400% MORE)
MORE Torque Capacity (100% MORE)
MORE Heat Resistance (50% MORE)

These *new* ROCKFORD Clutches and Clutch Plates have been developed by ROCKFORD Clutch Engineers to take full advantage of recently discovered facing material. Actual field tests on heavy duty equipment have resulted in adoption of MORLIFE clutches by builders of tractors, earth movers, graders, shovels, cranes, trucks, oil field equipment and power units. For information how these *new* Rockford MORLIFE Clutches will improve the operation and increase on-the-job hours of heavy duty machines, write Department E.

ROCKFORD Clutch Division BORG-WARNER

1303 Eighteenth Avenue, Rockford, Illinois, U.S.A.

CLUTCHES

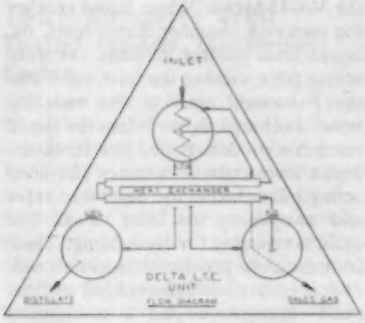
(94) Low-Temperature Extraction Unit for Water Locations

Delta Tank has completed field tests on a new model, low-temperature extraction unit, and is now offering units having nominal capacities of 5 MMSCFD and 10 MMSCFD as stock items.

These units were designed with offshore and marsh land platform space limitations in mind; hence compactness was a major consideration. The layout is such, however, that component parts are readily accessible for operation and/or maintenance.

Units are used in gas condensate systems to dehydrate the gas to sales line specifications and to increase distillate yields. Auto refrigeration accompanying pressure reduction across the choke on the inlet to the low-temperature separator provides the temperature drop, while heat exchange with the hot well stream keeps hydrates under control.

The principle of low-temperature extraction is not new—nor is its application; however, Delta's low-temperature extraction units do incorporate a number of unique features. Most noticeable are the use of spherical vessels and "in-the-skid" heat exchangers. The latter are completely metalized assur-



ing a minimum of maintenance. Their arrangement "in-the-skid" provides compactness and is said to eliminate most of the bothersome dripping and blowing of atmospheric condensation formerly encountered.

These units incorporate Delta's standard 30-in. diam spherical knockouts and spherical, low-pressure separators for the utmost in efficiency, compactness and accessibility.

Graloc couplings on the hp liquid level controllers make handlings possible by one man.

A special deflector, one of the results of extensive field tests, permits installation of the choke on the longitudinal center line of the low-temperature separator. A special mounting pad doubles as an inspection opening, thereby providing a highly desirable feature for little additional cost to the user.

Delta Tank Manufacturing Company.

(92) New Developments in Field Production Test Units

Most accurate and reliable oil, gas and water separating and metering system available has been developed by Oil Metering and Processing Equipment. Unit has actually shown accuracies as high as 99.9 per cent.

Simplified methods of control and adjustment make the unit flexible. It can be used to determine gas-oil ratios, make periodic production, drill stem and marginal tests, determine potentials, and make reservoir studies and evaluation surveys. Regulatory groups approve it to measure oil for co-mingling from several leases or from dual-completed wells, for tax and royalty payments, and unitized operations production checks.

System combines two field-proved vessels, a three-phase separator with two Vol-U-Meters, to make the accurately operating unit.

Within the separating vessel, an element on the fluid inlet removes gas from the oil and the gas is discharged through a mist eliminator into the gas meter run. Free water in the well fluid

Four Times Longer Life*

from Ampco Polished Rod Liners

...with fewer shut-downs for repairs, less loss of production, lower maintenance costs.

You can retard mechanical wear, corrosion and erosion with Ampco polished rod liners. Even in many of the toughest oil-well services, you can get four times longer life with these remarkable wear-resistant liners—made from Ampco Metal.

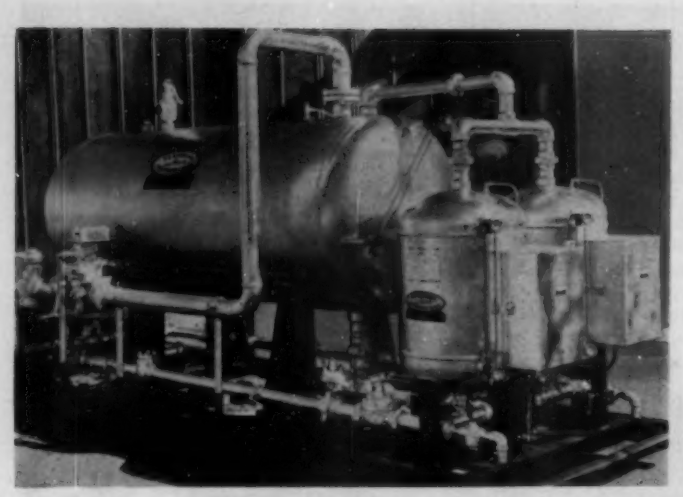
Find out today how much money you are spending for sliding wear and corrosion. Check on the "hidden costs" of ordinary liners. Then see how many dollars you can save with Ampco polished rod liners. For more information, just write us.

*Name of this user upon request.

AMPCO®
The Metal Without an Equal

AMPCO METAL, INC.
Dept. PE-8 • MILWAUKEE 46, WISCONSIN
West Coast Plant • Burbank, California

PR-22



settles to the bottom of the separator and is discharged through the water outlet to the water Vol-U-Meter. Oil-water interface is controlled by a snap-acting, rotary-type pilot. Oil flows from the separator through a Weir nipple into the oil line, carrying all emulsion with it, to the oil Vol-U-Meter.

Gas, flowing through runs manufactured in accordance with AGA specifications, can be measured with an orifice meter or an electronic flow computer. Oil and water are accurately measured by Vol-U-Meters (volume-type dump meters). After metering, the fluids can be re-combined or separately discharged.

Metering capacities for the Vol-U-Meters are graded from 0 to 288 bpd for the ¼-barrel per dump unit up to 0 to 4000 bpd for the 10.0 barrel per dump unit.

The Vol-U-Meter capacity is based on gravity flow from the separator to the Vol-U-Meter. When liquid reaches the metering chamber dump level, the liquid level control actuates the snap acting pilot, closing the inlet valve and simultaneously opening the metering vessel discharge valve. When the liquid reaches a predetermined low level, the liquid level control actuates the snap acting pilot closing the discharge valve and re-opening the inlet valve. The cycle is repeated for each dump. Thus, an accurately pre-determined unit volume is isolated and discharged and the cycle is registered on a mechanical counter or on a recorder. Unit capacity can be easily increased by maintaining a slight differential pressure between the separator and Vol-U-Meters.

Oil Metering and Processing Equipment Corporation.

Maximum Capacities

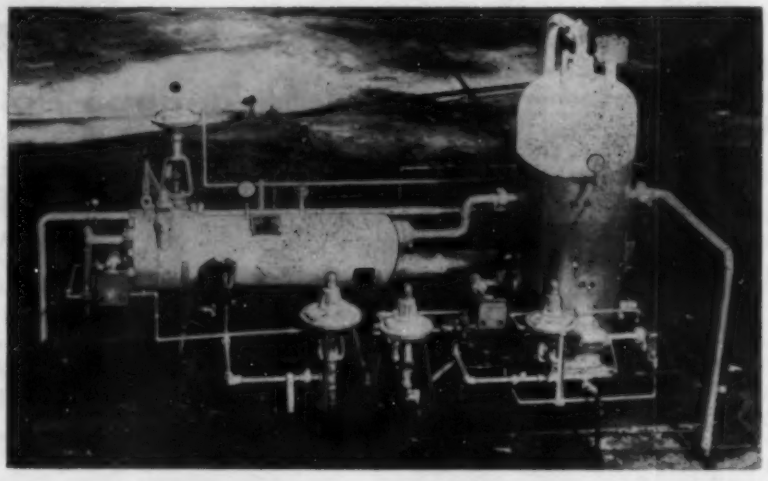
3-Phase Separator Diameter	16"	24"	30"	36"	48"
Max. total liquid capacity (oil plus water), BPD	500	1200	1800	2800	4800
Max. Water Cap., BPD	250	600	900	1400	2400
Max. Gas Cap., MMSCFD at 125 psi	0.6	1.5	2.4	3.6	6.4

Available working pressure: 125 psi through 3000 psi.

(91) Optimum System for Low-Temperature Separation

BS&B's Model MDH, a basic low-temperature separation system, is designed to process high-pressure gas-condensate. It recovers additional condensate and results in full profit benefits from the sale of the heavier, more valuable fractions.

Providing all basic equipment for this optimum condensate recovery, all vessels are engineered specifically for low-temperature separation and proved through field testing. Completely skid mounted, only the wellstream, sales gas and liquid draw-off lines need to be piped in to start processing. Additional recovery equipment, such as a second-stage separator or cold-feed stabilizer with product cooler, is easily added to this basic unit.



Operation. Wellstreams at high pressures (2000 to 6000 psig) are processed to obtain maximum recoverable hydrocarbon liquid and dehydrated gas at pipe line pressures (400 to 1500 psig).

Liquid hydrocarbons and water are removed in a high-pressure Model DC liquid knock-out. High pressure, liquid-free gas passes through heat exchanger with outlet sales gas, where it is cooled to controlled temperature of approximately 80 F. It is expanded through a choke into a low-temperature separator operating at or near sales line pressure. Temperature and pressure reduction across choke produces liquid hydrocarbon condensation. Water vapor is condensed as gas hydrates in low-temperature separator.

Separated liquid hydrocarbons and hydrates are heated in separator bottom, where hydrates are melted and water from hydrates and inlet knock-out liquid are separated. Liquid hydrocarbons are discharged through stage separation or stabilization to storage. Dry gas from low-temperature separator passes through heat exchanger, then to sales line.

Sizes are available to handle various gas flow rates up to 15 MMSCFD with flowing pressures up to 6000 psi. Over 60 standard systems are available, engineered specifically for various wellstream conditions to insure proper balance between cost and recovery.

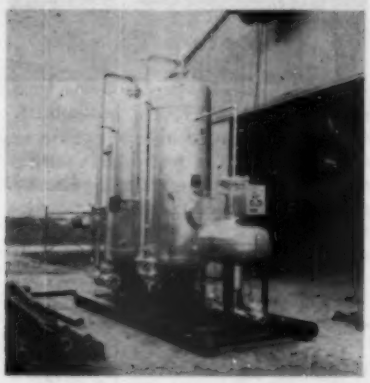
Black, Sivalls & Bryson, Inc.

(95) Compact Well Tester Needs Minimum Space

The new Rolo Skid-Mounted, Two-Stage Vertical Wellchecker has been introduced by Rolo Manufacturing. The well production is separated in two stages, and the oil is metered by the Rolocheck Oil Meter on the second-stage separator. Gas measurement facilities are provided on each separator.

These units are especially designed to occupy minimum square footage where space is at a premium, such as on water locations, but are just as adaptable to any oil field location.

For those extremely "hard-to-get-to"



locations, the daily production can be recorded on remote counters or chart recorders, by electrical means.

The unit comes to the field completely piped, mounted on a sturdy skid base, ready to be connected to the well and flow lines. Many accessories are available to fit particular operating conditions.

These units are available in many sizes and working pressures, to meet almost all field conditions. By utilizing the Rolocheck Oil Meter, the Rolo Wellchecker is practically maintenance-free, requiring no more service than any oil and gas separator.

Rolo Manufacturing Company.

(93) New Gas Dehydration Unit

Parkersburg Rig & Reel has introduced a new type of dehydration unit for high-pressure gas wells. It can be installed to serve individual wells, as a central unit for a number of wells, or at any other point in a pipe line gathering system.

The Weldrier is completely unitized and skid mounted and requires no auxiliary equipment such as separator, heater, or heat exchanger. Only four connections are required to put it on stream.

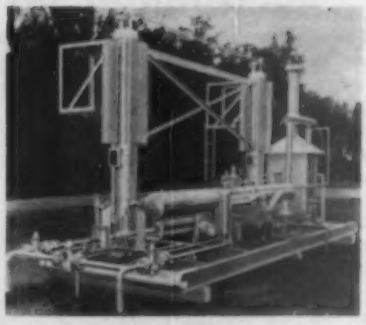
Unit is designed to operate on only half the amount of desiccant ordinarily required to dehydrate a given volume of natural gas. It also uses 80 per cent less fuel gas for heating and regenerating the desiccant packs.

The following are a few of the many new and original features claimed for the DAU Welder.

Inlet Separator: Entirely new design. Sets a new high for performance in achieving complete liquid-gas separation in a small space.

Dehydration Towers: Complete departure from conventional dehydration tower design to achieve high level of desiccant efficiency.

Regeneration Gas Heater: Heater is a completely new development, even to the burner. Its heat loss is only one-



half that of heaters used in conventional dehydrating equipment.

Control Valves: Cycle switching is

SPANG

MOLLOY BITS *are*

Superior

THE PROOF IS IN THE DRILLING. Think about this. Actual performance records compiled by drillers everywhere testify to the superiority of Spang Molloy Bits. Known results prove these completely heat-treated high molybdenum silicon alloy steel bits drill faster at lower cost in the hardest and/or most irregular formations. Its stronger blade section and greater pin strength enables the Spang Molloy Bit to overcome the abrasion and battering which causes ordinary bits to fail.

Play it smart and beat your tough drilling problems with Spang Molloy Bits!

SPANG & COMPANY

DEPT. O-7 BUTLER, PENNSYLVANIA

For over 60 years Manufacturers of Spang Weldless Jars and a Complete Line of Cable System Drilling and Fishing Tools for Oil and Gas Wells, Water Wells, Prospect Drilling and Shot Blast Holes.

controlled by two three-way valves. These were designed for this special use and achieve absolute zero leakage.

Regeneration Gas Rate Control: This gas stream is automatically controlled by a combination valve-controller developed especially for this function. It automatically adjusts the gas flow to the amount required instead of holding a constant rate of gas flow, regardless of requirements, as in conventional dehydration equipment.

Tower Switching Control: A completely new concept in control systems. The heating, cooling, and switching cycles are all controlled automatically.

Cooling and Condensation of Regeneration Stream from Pack: The new and unique method of dehydration employed in the Weldrier eliminates the need for heat exchangers and liquid traps. No auxiliary cooling is necessary.

Vessels and Piping: A new concept in unitary design eliminates the mass of large, high-pressure switching valves and piping that are required on conventional dehydration units .

From an operational standpoint, the inlet separator, dehydration towers, condensing and cooling means, condensed water receiver, and water-hydrocarbon, liquid separator are essentially a single vessel.

Diam. of towers in.	Cap. at 80 F and working pressure in 1000 MCF/D	Nominal working pressure psi	Weight of desiccant	Fuel consumption per day in MCF
10	3.25	840	257	0.9
12	4.6	840	386	1.2
16	7.3	840	646	2.2
24	17.5	1000	1400	2.9
30	28.0	1000	2300	4.0
36	40.0	1000	3350	6.0
10	5.0	1435	232	1.1
12	7.0	1435	344	1.5
16	12.2	1435	582	2.6
24	25.5	1500	1354	3.2
30	40.0	1500	2100	4.5
36	55.0	1500	3000	6.6
10	7.0	2950	174	1.4
12	10.3	3000	264	1.9
16	19.3	2100	500	2.7

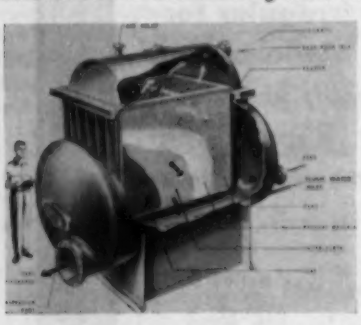
Parkersburg Rig & Reel Company.

Secondary Recovery

(102) Filter Doubles Secondary Recovery Rates

Dorr-Oliver announces availability of the Dorr-Oliver Hi-Rate Pressure Filter, a completely new, high-capacity water filter.

It is particularly recommended for oil field secondary recovery operations as well as for other water filtration applications that require a high-capacity unit with low installation and operating costs. A commercial scale Hi-Rate Filter has recently completed exhaustive field tests on oil field flooding water in



which filtration rates double those of conventional units were attained.

The Dorr-Oliver Hi-Rate Pressure Filter is an upflow, precoated, leaf-type pressure unit. It comprises 10 rectangular filter leaves housed in a closed tank surmounted by a dome in which filtrate is collected.

When the filtration cycle is completed, the flow is reversed to backwash the leaves. Water remaining in the dome flushes back through the slots and filter media, completely removing the cake and leaving a clean cloth ready for the next precoat application. This method of washing outwardly from the inside of the leaf assures complete removal of all solids and eliminates the need of troublesome sluice nozzles. Solids are then flushed to waste from the sloping bottom of the tank. Usually, only the water remaining in the dome after the filtration cycle is required to remove the cake.

Dorr-Oliver claims the major advantage of the Hi-Rate Filter is its high capacity and resulting lower installation and operating costs. Rates of 1.0 to 1.5 gpm/sq ft of filter area were attained in field tests on a 20-hr filter cycle. These rates were two to three times the accepted rate of 0.5 gpm/sq ft from conventional-type filters treating the same water and operating on a cycle of the same duration. Unusual leaf designs permit unrestricted passage of filtrate and backwash water and prevent entrapment of air.

Dorr-Oliver, Inc.

(101) Water-Flood Pump Fabrication Service Increased

Jones & Laughlin supply division has enlarged its pump unit fabrication plant in Tulsa, Oklahoma. It now offers skid mounted pump units for water-flooding and salt water disposal service to fit specific oil field requirements.

Typical of water injection pump unit is a 3 in. x 5 in. vertical triplex plunger pump, V-belt driven by a 50 hp electric

motor. The V-belt drive assembly is completely enclosed in a belt guard to assure safety for personnel during operation. The pump and electric motor are mounted on an h-beam structural steel skid as a complete portable unit ready for operation. The illustrated unit was designed for a capacity of 3200 bbl per day at a discharge pressure of 750 psi.

For salt water disposal service a J&L pump unit consisting of a duplex reciprocating piston power pump, V-belt driven by a multi-cylinder engine or electric motor is available. The pump is fitted with a bronze fluid end for corrosive fluid service. A force feed lubricator is mounted on the pump for piston rod stuffing box lubrication. The pump and driver are mounted on a compact, well-designed structural steel skid for complete portability.

The supply division also fabricates and assembles a complete line of pump units for use in all oil field applications. Most all brands of rotary, centrifugal, piston, plunger and vacuum pumps are mounted on skids, powered with a gas, gasoline, or diesel engine, or electric motor direct connected or V-belted as desired. These units are custom built to fit customer's need.

Jones & Laughlin Steel Corporation —Supply Division

Corrosion Control

(106) Inorganic Coating 'Cold Galvanizes' Existing Structures

Existing steel structures in the petroleum industries can now be given the same protection that galvanizing affords, plus salt water resistance, with a protective coating called Dimetcote.

Not a paint, although applied with

Protective caisson in the open waters of the Gulf of Mexico, Dimetcoted three years ago, is still untouched by rust or corrosion.

either brush or spray, Dimetcote is a 100 per cent inorganic, metallic zinc coating that contains no oils or resins. Only one coat is required for most applications.

Not only is Dimetcote claimed to be unusually resistant to severe weathering and abrasion, but it is unaffected by solvents and petroleum products. The coating has been proven in use in a wide variety of refinery and producing installations, such as structural steel, floating roof tanks, barges, marine drilling towers, tankers, and exploration ships.

A unique feature of the coating is that the film cathodically inhibits corrosion of contiguous areas of bare steel. According to the manufacturer, when Dimetcote is applied, a reaction takes place at the surface that produces chemical bonding as well as physical adhesion, so that it is almost impossible to find the interface.

Amercoat Corporation.

(107) Alloy Compatible with 'Petroleum' Salt Water

Over the years, bronze has been the specification for pumps used in or around common sea or salt water. Yet with the gradual increase in importance of "petroleum" salt water, designers and men in the field find that not

Engine-driven Ampco centrifugal pump mounted on fabricated steel skids for use in the petroleum fields.

Tips on Mud Valves for Toolpushers . . .

Tom J. Beaty on the left and driller, L. E. Mariner with a group of MUDWONDER mud pump manifold valves.

Slim Hole Rig Sets Drilling Records with 2000 PSI Mud and MUDWONDER Valves

By Tom J. Beaty, partner, Rig #1, Slim Hole Drilling Company, Houston, Texas

SINCE we rigged-up our new slim hole rig last July we have been setting records regularly on amount of hole per day and top to bottom time. One of the big reasons for these records, we feel, is the Rockwell-Built MUDWONDER mud valve which is used on all our mudlines.

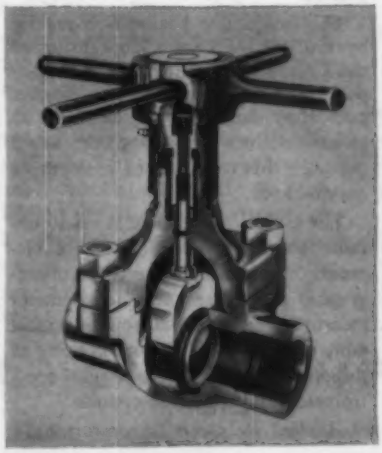
This valve has done a remarkable job for us without downtime or repairs. It's easy to operate—we use 2000 psi line pressure regularly and never have any trouble. Besides, the one-piece body does away with body misalignment and keeps repairs or part replacements, if needed, simple and quick.

For economy—and economy is the main reason for slim hole drilling so we are extremely conscious of it—we equipped our new rig with MUDWONDER mud valves. We are using them on the pump manifold, the stand-pipe, the fill-up line and the blow-out preventer manifold very successfully.

I can recommend MUDWONDER to any toolpusher having mud valve trouble. MUDWONDER valves are built in 2", 3", and 4" sizes with screwed or flanged ends and ratings of 2000 psi WP (4000 psi test) and 3000 psi WP (6000 psi test).

See your favorite oil field supplier for complete information, or write Edward Valves, Inc., East Chicago, Indiana.

MUDWONDER cut-away view shows the double thread construction, separated stainless stem and hard chromed gate with "T" slot connection and the one-piece seat insert with the buna-N molded integrally over the steel wear rings.



even bronze is impervious to erosion and corrosion from this new source. Petroleum salt water will not tolerate zinc, and wears away any soft, bronze-like material.

Recent exhaustive field tests prove that Ampco Metals, since they contain no zinc, resist petroleum salt waters superbly, according to the manufacturer. In fact, petroleum salt waters have been found to generate a dense and self-healing protective film on Ampco Metal. Field men refer to this film as "Black Patina."

Great reduction of wear and corrosion resulting from the use of Ampco Metal by no means entails the sacrificing of good equipment design. Ampco Metal is applicable to intricate sand and centrifugal castings, extruded rod and shapes, pipe, tubing, sheet and plate. The alloys are also readily welded with Ampco-Trode Weldrod. This is a series of five, a-c d-c electrodes having approximately the same chemical and physical characteristics as the Ampco Metal series.

The Ampco Metal series offers a wide range of physical properties, yet retains the same basic chemistry — and similar basic resistance to corrosion. Through choice of the proper grade, it is possible to obtain tensiles ranging from 60,000 to 110,000 psi, hardness from 70 Rockwell "B" to 35 Rockwell "C," and elongation up to 45 per cent.

Regularly handling such chemicals as sulfuric, phosphoric and acetic acids, phthalic anhydride, phenols and furfural, Ampco alloys are claimed to display the highest degree of corrosion resistance combined with excellent resistance to wear and cavitation-erosion.

Ampco Metal, Inc.

(108) Corrosion Coupon Injector

A new tool designed for gathering corrosion data on equipment under continuous operation has been announced by Willis Oil Tool. The Willis Corrosion Coupon Injector is a hydraulically actuated tool designed for the injection and withdrawal of metal samples in tanks, pipe lines, vessels, and columns while under high pressure.

For environmental studies in preventive maintenance, the sample injector is a simple, compact device for subjecting the coupon to the system without shutting down or installing expensive, inefficient by-pass piping.

A removable piston carries the sample in or out of the high-pressure line or vessel. The cylinder and piston assembly may be removed by backing off and leaving the lower end of the piston assembly in a locked position. The cylinder is then free to be used at other sampling points. Base of the coupon inector is screwed into a standard, welded, and drilled half coupling, or tee.

Willis Oil Tool Company.

(109) Spectroscopy Revolutionizes Preventive Maintenance

A new, automatic instrument that many believe will revolutionize diesel engine maintenance procedures is being manufactured by Applied Research Laboratories.

Instrument, called the "Quantometer," is being used to check condition of diesel engines by thorough analysis of crankcase oil.

The Quantometer, using only a half teaspoon of sample oil, provides a complete quantitative analysis in two minutes, recorded on a direct-reading chart. Correlation of the analysis with known engine data then enables engineers to detect wear and other factors before there is a chance of engine damage. Instrument permits great savings in time over usual procedures and, since it detects elements to the millionth part, it provides immediate data not readily obtained by other methods. A reading that deviates from a known standard is thus the earliest indication of incipient trouble.

This instrument has been in regular operational use in the laboratories of the Chicago and North Western Railways for three months. In that time, reports the railroad, thousands of dollars in maintenance costs have been saved through this program of preventive maintenance.

The C&NW instrument is set to obtain quantitative readings on 16 elements, and eliminates need for photographic procedures and densitometer measurements. Operating on the optical emission principle, the unit consists of three sections: Multisource unit, spectrometer, and recording console.

Applied Research Laboratories.

(110) Sprayable Plastisol

Film thicknesses of 50 to 60 mils per spray coat, triple the thickness previously possible, can be obtained with a newly formulated sprayable plastisol, announced by the electroplating and coatings division, Metal & Thermit.

Known as "Unichrome Super 5300," the new coating makes possible gun application of the full solids content of vinyl plastisol without a diluent, the company reports. As a result, a pore-free 50 to 60-mil coat can be successfully applied in one layer, which gives "sheet" protection to tanks, ducts, and other large equipment, it is claimed. Because it is sprayed on, there are no seams where corrosives might penetrate.

A compound based on vinyl resins, Unichrome Super 5300 is resistant to the corrosive action of strong acids, concentrated caustic and salt solutions, and other corrosive materials. Satiny smooth in appearance, the material forms a tough, flexible film that absorbs impact without chipping, withstands abrasion, and has desirable acoustical and electrical insulating properties, according to Metal & Thermit engineers. Field evaluation reports indicate that the new plastisol coating permits the substitution of ordinary metals for costly alloys.

Metal & Thermit Corporation.

Field Pumps — Engines

(111) New 75-200 BHP Packaged Gas Compressor Introduced

The new CFA packaged compressor introduced by Clark Bros. has been specially designed for oil and gas field use. It is well suited to gas gathering, gas lift, and other applications requiring a unitized compressor station in the 75-200 bhp range.

Unit consists of a newly designed balanced/opposed compressor that is mounted on a steel skid and is direct-driven by an oil field-type gas engine. A radiator is included to permit intercooling of the gas between stages and to also cool the lube oil and compressor cylinder jacket water. A scrubber and dump trap can also be provided to remove condensate and moisture from the gas stream between stages.

Compressor Design

Unit has 5-in. stroke and two horizontally opposed compressor cylinders which project from opposite sides of the crankcase. The unit features the balanced/opposed principle used on the larger 8-in., 14-in., and 17-in. stroke

"Production increased 500%; lifting costs are extremely low"

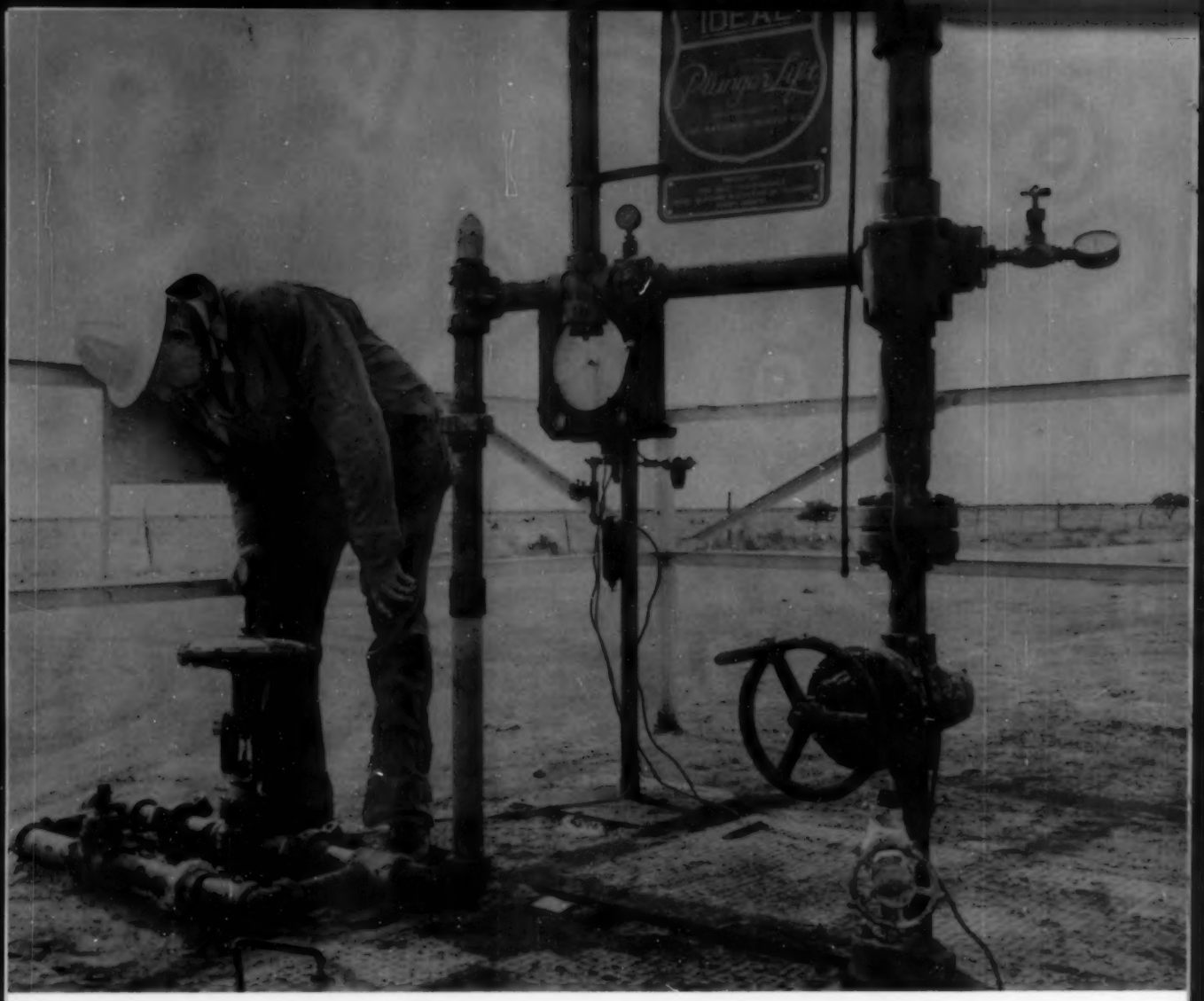
That's the report from one of our field engineers on a National Plunger Lift operating in Oklahoma. The unit was installed 5 years ago on a "problem well," then averaging 70 barrels per month production. Today, this well's 5-year average production record is 365 barrels per month! Almost 61 million cubic feet of gas also have been obtained during this time—at a value that alone paid for the initial cost of the Plunger Lift.

Not every National Plunger Lift shows such remarkable results, of course. But the list of satisfied users is growing rapidly, and the records are impressive.

For example: In a 5200 ft. Kansas well, a National Plunger Lift recently raised production 25% and eliminated paraffin deposits in the tubing. One doubled gas production for a California operator. Units in the Newcastle, Wyoming, area boosted production by an average of 30% and on some wells cut maintenance expenses from a high of $8,000 per year to an average of $250! Pleased with National Plunger Lift performance, two customers in Ohio and Michigan have recently ordered 5 more. And so it goes.

As you can see on the next two pages, the Plunger Lift is a specially-designed product applicable to certain types of wells. Most important, however, is the fact that it *dependably* meets the needs for which it is built, and helps producers lower their recovery costs. As such, it is typical of all quality equipment—drilling machinery as well as production units—bearing the National Blue Label.

THE
NATIONAL SUPPLY
COMPANY



NATIONAL'S PLUNGER LIFT® PAYS FOR ITSELF QUICKLY ON MANY TYPES OF WELLS

If you need a proved, low-cost system for prolonging production from wells with declining natural energy, don't overlook National's Plunger Lift. Simply designed, easy to install and economical to operate, it uses either formation or injected gas to step up recovery in—

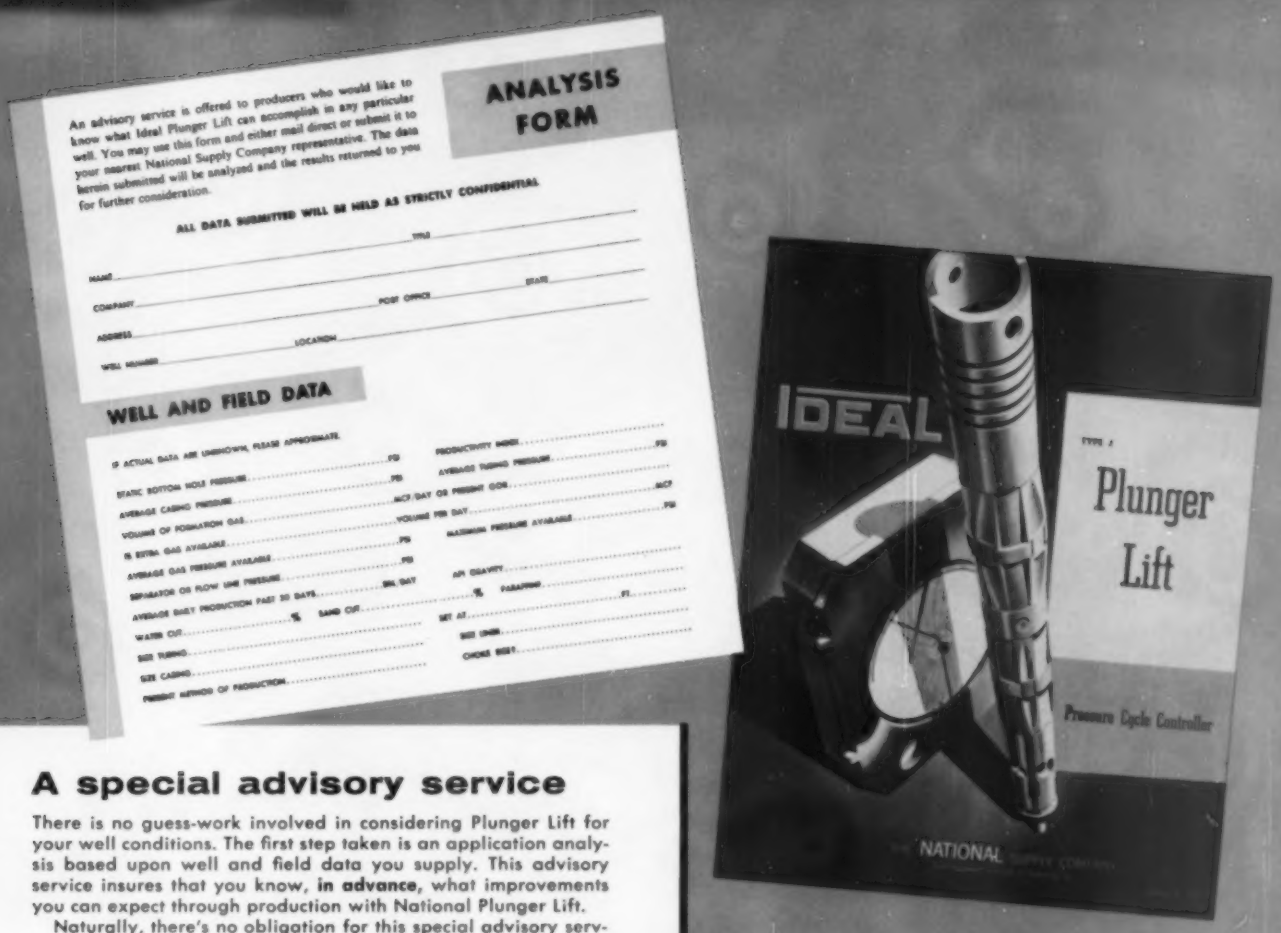
- Weak-flowing wells, shallow or deep, with high gas-oil ratios and low P.I.
- Wells on gas lift, with low P.I.
- Wells too difficult to pump because of gas-locking
- Gas wells that load up with water

Adaptable to any wellhead, the National Plunger Lift also helps to overcome costly well conditions by preventing and removing paraffin deposits, preventing bottom-hole water accumulations, and reducing emulsion and scale deposits to a minimum.

With no added gas, the Plunger Lift operates at lower pressures than required for natural flowing wells. With added gas, it maintains low injection pressures, thereby getting the greatest percentage of a well's theoretical production by gas-lift methods.

These economical operating features of the Plunger Lift, along with its low initial and service costs, make it a unit that pays for itself quickly wherever you put it to work.

To learn specifically what a Plunger Lift can accomplish in your production operations, get in touch with your National Supply representative. Along with the material on the opposite page, he'll be glad to give you the whole, profitable story. See him soon.


ANALYSIS FORM
An advisory service is offered to producers who would like to know what Ideal Plunger Lift can accomplish in any particular well. You may use this form and either mail direct or submit it to your nearest National Supply Company representative. The data herein submitted will be analyzed and the results returned to you for further consideration.
ALL DATA SUBMITTED WILL BE HELD AS STRICTLY CONFIDENTIAL
NAME
TITLE
COMPANY
POST OFFICE
STATE
ADDRESS
LOCATION
WELL NUMBER
WELL AND FIELD DATA
IF ACTUAL DATA ARE UNKNOWN, PLEASE APPROXIMATE.
STATIC BOTTOM HOLE PRESSURE
PRODUCTIVITY INDEX
AVERAGE CASING PRESSURE
AVERAGE TUBING PRESSURE
VOLUME OF FORMATION GAS
MCF/DAY OR PRESENT GOR
IS EXTRA GAS AVAILABLE
VOLUME PER DAY
AVERAGE GAS PRESSURE AVAILABLE
MAXIMUM PRESSURE AVAILABLE
SEPARATOR OR FLOW LINE PRESSURE
AVERAGE DAILY PRODUCTION PAST 30 DAYS
BBL/DAY
API GRAVITY
WATER CUT
% SAND CUT
% PARAFFIN
SIZE TUBING
SET AT
FT.
SIZE CASING
SIZE ORIFICE
PRESENT METHOD OF PRODUCTION
CHOKE SIZE
IDEAL
TYPE J
Plunger Lift
Pressure Cycle Controller
NATIONAL

A special advisory service

There is no guess-work involved in considering Plunger Lift for your well conditions. The first step taken is an application analysis based upon well and field data you supply. This advisory service insures that you know, **in advance**, what improvements you can expect through production with National Plunger Lift.

Naturally, there's no obligation for this special advisory service, or technical bulletins describing Plunger Lift systems. You can get Analysis Forms and literature at the nearest National Store, or from a National field representative. May we serve you soon?

NEW DUAL RELAY PLUNGER LIFT®!

National has a Dual Relay Plunger Lift for high P.I. wells and larger producers which are beyond the capacity of single plunger operation. Two plungers now can be run in the same string of tubing to accomplish faster cycling, at lower operating pressures and increased capacity.

The bottom plunger lifts the oil from the well bottom to the halfway point, where the load is transferred to the top plunger and carried to the surface. The two plungers always travel in opposite directions, making contact only at the halfway point for load transfer and valve reversal. Simple controls are all located at the surface.

THE NATIONAL SUPPLY COMPANY

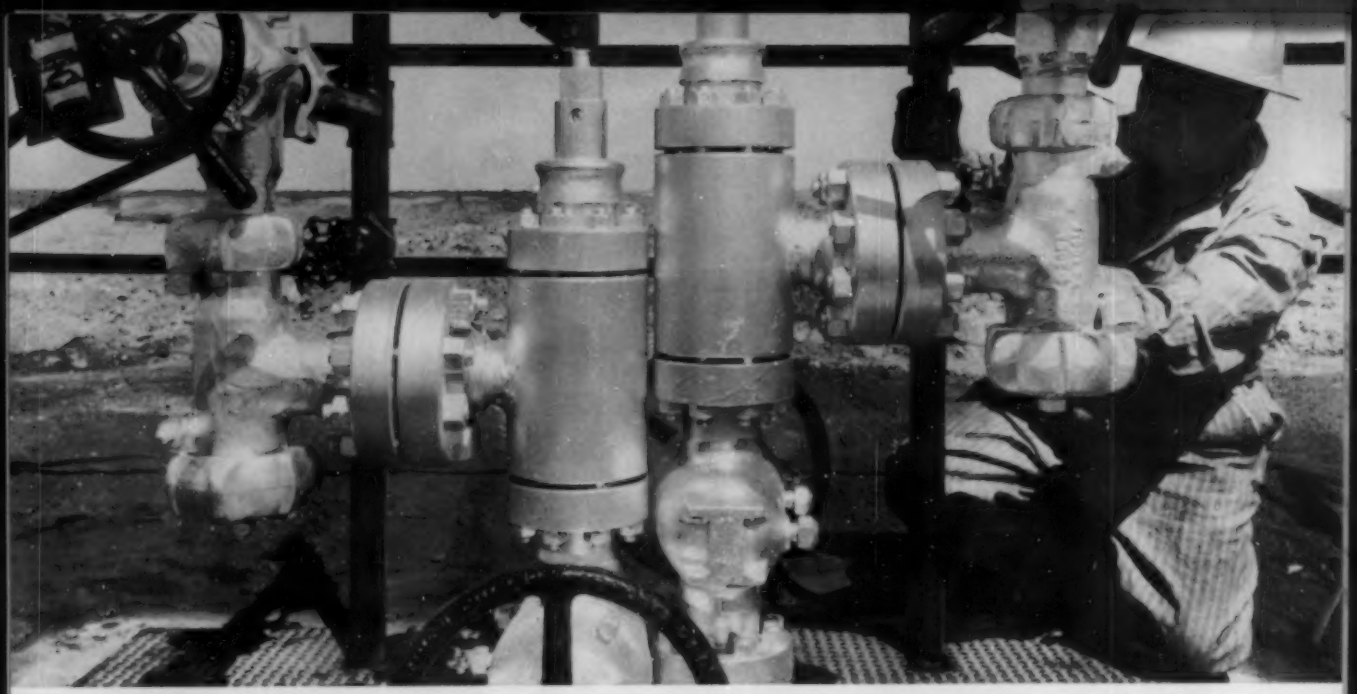
MAIN OFFICE: Two Gateway Center, Pittsburgh 22, Penna.
DIVISION OFFICES: Denver; Ft. Worth; Houston; Toledo; Tulsa; Torrance
CANADA: The National Supply Company, Ltd., 200 F. W. Clark Building, 709 Eighth Avenue, West, Calgary, Alberta
EXPORT: 600 Fifth Avenue, New York 20, N.Y., U.S.A.; City Wall House, Chiswell Street, London E. C. 1

NATIONAL BLUE OIL FIELD MACHINERY AND EQUIPMENT
SPANG STEEL PIPE AND ELECTRICAL CONDUIT

ON THE NEXT PAGE:

MORE NATIONAL

PRODUCTION EQUIPMENT



You get safe, economical production with NATIONAL Wellhead Equipment!

From the bonnet to the casing flange, every component part of a National Wellhead assembly is designed, built and tested for specific service application. The following main features of National Wellhead Equipment insure maximum performance with utmost safety—

- Ease of assembly—parts are self-locating and self-activating, no special tools are needed for installation.
- Maximum flexibility—interchangeable units afford a multitude of combinations to meet your specific requirements in size, capacity and type.
- Pre-tested safety—National's triple-sealed Pressure Pack design insures trouble-free performance and longer service life. Intensive testing procedures include special methods more severe than those specified by API standards.

You'll find National Wellhead Equipment readily available through all National Supply Stores—as well as complete advisory service on wellhead application problems. The complete line includes a wide variety of tubing hangers, bonnets, flanged and screwed fittings, valves, flow beans and specialty items to meet your every need. It will pay you to use this quality equipment—and the service that comes with it.

THE NATIONAL SUPPLY COMPANY

MAIN OFFICE: Two Gateway Center, Pittsburgh 22, Penna.
DIVISION OFFICES: Denver; Ft. Worth; Houston; Toledo; Tulsa; Torrance
CANADA: The National Supply Company, Ltd., 200 F. W. Clark Building, 709 Eighth Avenue, West, Calgary, Alberta
EXPORT: 600 Fifth Avenue, New York 20, N.Y., U.S.A.; City Wall House, Chiswell Street, London E. C. 1

NATIONAL BLUE OIL FIELD MACHINERY AND EQUIPMENT
SPANG STEEL PIPE AND ELECTRICAL CONDUIT

You get sound performance, too, from . . .

NATIONAL Pumping Units

These pumping units are manufactured in 22 standard combinations, in the range of API rated beam loads from 3,200 to 32,400 lbs. There's a model to economically suit every pumping job.

NATIONAL Triplex Pumps

These pumps provide maximum volume and injection pressures for today's waterflood projects. Available in several hp ratings for both corrosive and non-corrosive service, these National Pumps are also suited as power-oil source for subsurface hydraulic pumping, oil gathering and salt water disposal services.

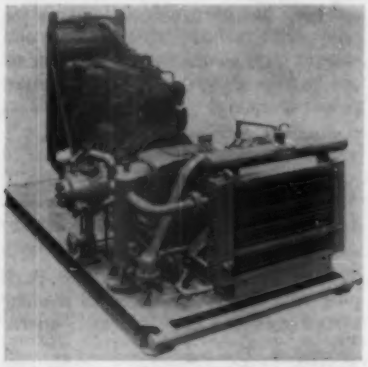
NATIONAL Sucker Rods

You get trouble-free service with National's precision-manufactured sucker rods. They're engineered for top resistance to shock, corrosion, fatigue and impulse loads. Top-quality National Sucker Rods are available in a range of grades for every well condition.

compressors which have gained wide acceptance in the process and industrial fields.

Because each reciprocating force is opposed by an equal and opposite force, there are no unbalanced vertical or horizontal forces in the CFA; they are all cancelled out. The CFA is virtually vibrationless in operation.

In test, CFA was placed on a perfectly smooth floor and run without being bolted down or restrained in any



way. Operating at rated speed and various loads, the unit remained motionless. CFA is also readily adaptable to operation on floating barges for use in the bayou country, or on trucks and trailers when a portable unit is required.

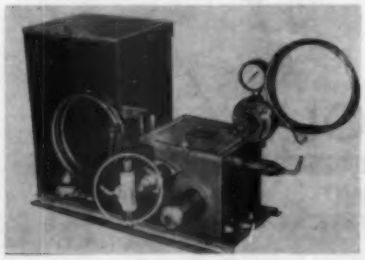
Compressor Radiator

An oversized radiator of the finned tube type is provided for lube oil cooling, compressor cylinder jacket water cooling, and intercooling of the gas stream between stages if required. Oversizing of the radiator prevents overheating during the extended periods of high ambient temperature encountered in the Southwest. The inner surface of the radiator tubes can be readily inspected or cleaned if ever required by removing the plugs immediately opposite the ends of the tubes. The radiator fan is driven from the end of the compressor shaft.

Clark Bros. Company.

(113) Injectors Feature Meehanite Head

Series 1100 and 3600 Texsteam Chemical Injectors have been supplemented with Series 1200 (S-Beam Type) and 3700 (Gas-Driven Type).



These models are of advanced design and offer still better performance than the former series. An important change is in the injector pump head, now made of Meehanite castings instead of brass or bronze. All pump packings are now of Hycar.

The new Meehanite head offers greater resistance to a wider range of corrosive action. It satisfactorily handles practically all compounds commonly used for emulsion breaking or corrosion injection service.

New series injector heads may be used on 1000, 1100, 3500 and 3600 chemical injectors; however, new Hycar packing is not adaptable to these heads.

Texsteam Corporation.

(112) Versatile Turbine Pump

The Johnston vertical turbine pump has proved to be one of the most versatile performers in the entire oil industry because of the many ways in which it is used. Few other types of equipment have more varied application.

On many rigs, for instance, and in many oil field camps, a Johnston vertical turbine furnishes vital fresh water. As a booster, a Johnston often helps move crude from the field to the refinery. In the refinery, Johnstons are used as transfer pumps, circulation pumps, condenser pumps, and for cooling towers. And finally, many a finished product is delivered to its ultimate consumer via a Johnston, used as a dispensing unit.

The pump is offered with a variety of discharge heads, with open or semi-open impellers, with vitriform or cast-bronze bowls, oil or water lubrication, and with a choice of drives.

For handling volatile fluids or those near the boiling point, the pump is furnished with a mechanical seal that is readily accessible at the surface for easy adjustment or replacement without pulling the pump. The seal reduces leakage to a negligible amount and eliminates stuffing box maintenance. For many applications, Johnston's exclusive "Unit-line" construction can be supplied, entirely eliminating the need for packing or mechanical seals with consequent savings in servicing.

For applications involving extremely low NPSH requirement, as stripping service in tanks or barges, Johnston combines turbine stages for pressure and an axial flow stage.

Johnston vertical turbines are available in many sizes, ranging from 4 to 30 in., in power from ¼ to 1000 hp, and in capacities from 25 to 10,000 gpm.

Johnston Pump Company.

Production Maintenance Service

(117) New Controls Over Gyp Accumulations

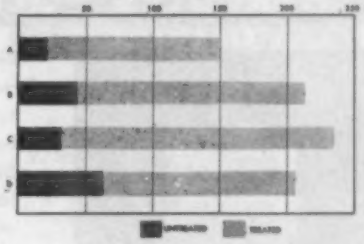
Research laboratories of Cardinal Chemical announce development of "Nocor 802"—a new chemical means of controlling concentrations of calcium sulfate (gyp) in producing oil wells, treaters, pipe lines, cooling towers, and other equipment.

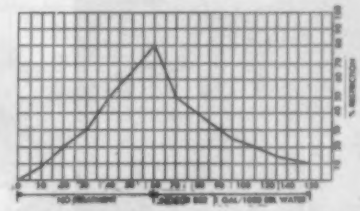
This product—considered a milestone in problems of water treating—permits easy handling by untrained workers. It releases no vapors harmful either to human beings or animals.

Nocor 802 both removes and controls gyp accumulations, forms no insoluble scale deposits of its own. There are said to be no adverse side reactions.

Checks on controls or concentrations are unnecessary as is so often the case in more conventional water-treating compounds.

Fig. 1 shows effect of Nocor 802 on pumping oil wells in various fields. Before Nocor 802 was used, Well "A" was able to produce only 20 consecutive days before acidizing or pulling. Since Nocor 802 treatment was instituted, well has produced continuously without interruption. Graph was drawn





at the end of 130 days on a schedule of 1 pint Nocor 802 per day per 60 bbl of water produced.

In Well "B", acidizing or pulling was required every 45 days. Cardinal recommended treatment with 1 quart Nocor 802 per day for each 1000 bbl of water produced. Workmen arbitrarily reduced concentration to 1

pint Nocor 802, and it became necessary to pull the well at the end of 230 days. Cardinal feels that if full treatment had been given, no pulling would have been required.

Wells "C" and "D" are examples of continuous success with Nocor 802. In Well "C", 2 quarts of Nocor 802 are used for each 600 bbl of water produced. In Well 'D", the ratio is 1 gal of Nocor 802 per 1200 bbl of water. These wells are continuing to produce without interruption.

Fig. 2 shows effect of Nocor 802 in removing gyp depositions in oil field gathering lines. Gyp restriction rose rapidly and was 80 per cent complete at the end of 60 days. When Nocor 802 was introduced into the system in a ratio of 1 gal:100 bbl water, the lines began to clear. Within 70 days, lines were only 10 per cent restricted. Treatment continues.

Cardinal Chemical Company.

(124) Weed Control Compound

"Ureabor" is a sodium borate-substituted urea complex, scientifically formulated by a special process into a granular herbicide, which is particularly adapted for dry application.

Pacific Coast Borax's "Ureabor" combines into one potent herbicide the

proven weed-destroying characteristics of both the sodium borates and the substituted ureas. This combination makes possible good control of undesirable vegetation with relatively low rates of application. In addition to its direct herbicidal action, the sodium borate prolongs the action of the substituted urea by inhibiting its decomposition by soil microorganisms. Thus, the combination gives a residual effect that reduces the necessity for costly repeated applications.

It is recommended for the control of both broad-leaf and grassy weeds, and designed especially for industrial sites and rights-of-way where long-term control of the vegetation is desirable. Suggested rates of application range from ½ to 2 lb/100 sq ft, with the higher rates recommended on perennial species, or where the annual rainfall exceeds 35 to 40 in.

Another outstanding feature of "Ureabor" is its free-flowing, dust-free, granular form, which makes it ideal for dry application. This eliminates the necessity of expensive spray equipment or hauling water. It is nontoxic when used as directed, nonflammable, and noncorrosive to ferrous metals. Thus, "Ureabor" can be safely and easily applied by hand broadcast, or by use of a specially designed PCB hand spreader. This inexpensive hand spreader has been especially designed to apply "Ureabor," which enables one man to treat as much area per hour as can be treated with a two-man operated power spray rig.

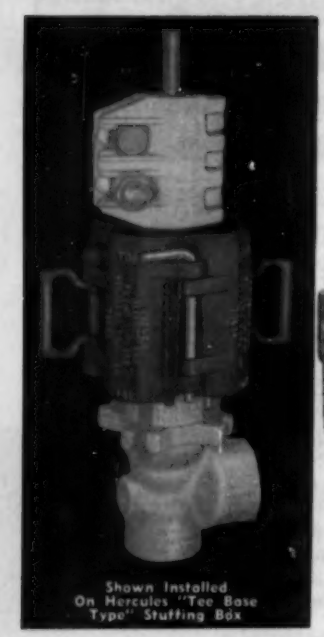
Pacific Coast Borax Company.

(123) New Triple Ignitors Announced

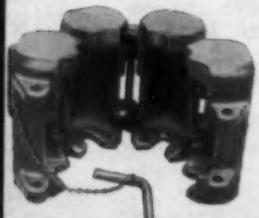
Stitt Ignition announces that its New Triple Ignitors, improved oil field spark plugs, are now available in all popular thread sizes—14 mm, 18 mm, ⅞-in-18,

Prevent Damage to Packing and other Component Parts with a

HERCULES POLISHED ROD CLAMP-OFF SUPPORT



Developed to prevent damage to the packing and other component parts of Hercules Stuffing Boxes while "clamping-off." Transmits weight of rods to tubing by resting upon top of the Stuffing Box body. Fits all types Hercules Duplex Stuffing Boxes. Made up of four sections hinged together, making it easy to install around Stuffing Box and is locked by means of a latch pin. Handles are provided to facilitate handling. Constructed of high grade malleable iron. Will accommodate all size polished rods and liners up to and including 1¾". Will safely support the longest string of rods.



Write for Complete Information

AVAILABLE THROUGH ALL SUPPLY STORES

POSITION OPEN

HERCULES TOOL *Company*

MANUFACTURERS OF OIL FIELD EQUIPMENT SINCE 1924

GENERAL OFFICES AND PLANT TULSA, OKLAHOMA

Export Representative: Oil Field Equipment Co., Inc., 30 Church Street, New York 7, N. Y.

long reach 7/8-in.-18, 1-1/32-in. straight pipe and 1 1/8-in.-12.

These are designed for all field service applications and have been field tested and proven. They are made in sufficient heat ranges to cover all oil field applications—drilling, field pumping, compressor, pipe line, or generator service—and are said to improve performance of present oil field engines.

Advantage of the Stitt New Triple Ignitor is basically due to the massive large center electrode and the triple ground wire construction that make this plug unique and give it long life. This Stitt New Triple Ignitor is engineered for oil field use and features ease of gap setting.

Stitt New Triple Ignitors are claimed to last from three to five times longer than the average spark plug now being used in the field, and there are many reports that this plug lasts 10, 20 and even 30 times the life of ordinary spark plugs. In a recent published report of a test in California on an NK Waukesha, driving an Ingersoll-Rand compressor, these spark plugs were still running after 32 months in comparison with ordinary spark plugs that lasted less than two months.

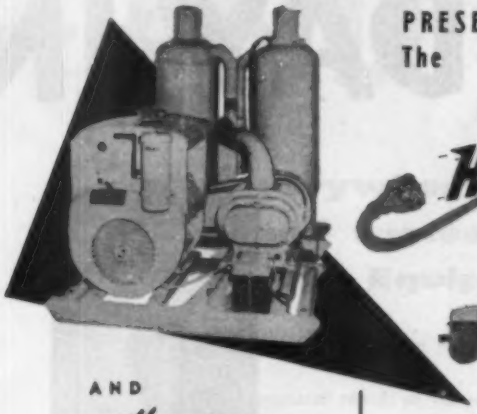
In the above-mentioned test, the magneto needed no repairs during this time. It has been found that magneto life has been increased and magneto repair costs cut by the use of Stitt New Triple Ignitors. Many operators report as much as a 40 per cent reduction in magneto repair bills when using Stitt New Triple Ignitors.

Stitt Ignition Company.

(115) Expansion Increases Chemical Service

Frontier Chemical announces the completion of a more than three-fold expansion of its electrolytic chlorine and caustic soda plant at Wichita, Kansas, where its home office is also located.

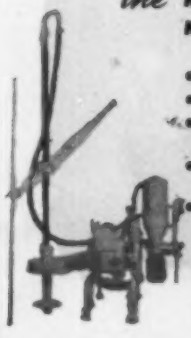
The new plant will augment Frontier's production of muriatic acid used



PRESENTING The HI-VAC DRILLING SYSTEMS

Adaptable to geophysical, shot hole, blast hole, rat hole or surface pipe drilling rigs. Drills to 2000 feet. Removes cuttings at rate of 1 to 36 tons per hour.

AND the MIGHTY MIDGET



- Weighs 125 lbs.
- Uses No Water
- Completely Portable
- Recovers 100% of Cuttings
- McCulloch 9 H.P. Gas Engine

DRILLS BY VACUUM
No Fuss! No Muss! No Dust!

Impossible to lose circulation. Will drill anywhere you are drilling today with air and eliminates trouble found in forced air drilling. 100% dust free, eliminating danger of silicosis. Automatic sampling device gives you geologically an accurate and scientific record of all formations. Removes cuttings by pulling partial vacuum inside drill pipe. By the reverse flow of free air down annulus, bits are kept 25% to 60% cooler. Will drill formations with high water content. For further information and brochure write, call or wire Houston Tool Company, Santa Susana, California.

PRODUCTS OF THE HOUSTON TOOL CO. | SANTA SUSANA, CALIFORNIA

THERE'S NO SUBSTITUTE for LUBER-FINER'S ENGINEERED PROTECTION

YES! IT'S WHAT'S INSIDE THAT COUNTS
The Efficiency of Luber-finer's Exclusive Patented Process HAS NEVER BEEN EQUALLED!

USE ONLY GENUINE Luber-finer DIESELPAKS

Only a Luber-finer Unit Plus a Genuine Luber-finer Pack can give the Exclusive Patented Filtering Process that has made Luber-finer The Standard of The Industry Since 1936!!

THERE'S A LUBER-FINER MODEL FOR EVERY TYPE OF ENGINE—EVERY TYPE OF OIL!!

LUBER-FINER PACKS AVAILABLE

1. REFINING PACK
Introduced to the public in 1935 for use with straight mineral oils, fuel oils, hydraulic oils, and inhibited industrial oils.

2. DIESELPAK
First made available in 1941, the DIESELPAK was primarily designed for use with H.D. detergent compounded oils and has also achieved outstanding results when used with fuel oils and straight mineral oils.

DON'T BE MISLED BY PRICE ALONE!

There is no substitute for DIESELPAK'S Patented Filtering Process for H.D. Compounded oils AT ANY PRICE!
The DIESELPAK cleans more oil faster—keeps it CLEAN longer—and gives more service and better engineered protection than ANY of the substitute filtering elements being offered for Luber-finer units.

IT PAYS TO GET THE BEST!

STANDARD OF THE INDUSTRY SINCE 1936

Luber-finer Units are Standard and Optional Equipment on America's Leading Diesel Trucks, Tractors, Stationary Engines.

Write for Complete Information to Dept. 105

LUBER-FINER, INC.
2514 S. Grand Ave., Los Angeles 7

for acidizing wells in the Mid-Continent, while the increased caustic production will be available to refineries for distillate treating and neutralization as well as for drilling mud conditioning. Salt, produced at the Denver City, Texas, plant is another Frontier product useful in drilling mud.

The continued growth of the petroleum industry in the South Central and Southwestern states has been largely responsible for this latest multi-million dollar expansion program at Wichita.

Founded only as recently as 1946, Frontier's plants now produce in excess of 500 tons of products per day, making the company the largest chlor-alkali producer in the South Central region, according to company claims. Both plants feature direct tank truck deliveries in company-owned equipment, a service developed specifically for oil field customers.

Frontier Chemical Company, a division of Union Chemical & Materials Corporation.

(118) New Developments in Paraffin Control

In the past year, new applications for the control of paraffin have been developed by BrakeSol.

Basic application for Brakesol is that of keeping the paraffin in the oil from the formation to the refinery. Most effective application for this purpose

is that of constant injection down the annulus by use of a chemical pump. Of course, this can only be accomplished on wells without packers.

One new method of treating flowing wells with a packer is by the use of a bottom-hole injection valve. The annulus is loaded with BrakeSol and oil and this mixture is forced through the bottom-hole injection valve by use of a volume chemical pump.

Still another development has been the use of hollow sucker rods. The paraffin in the system can be controlled by installing hollow sucker rods to below the paraffin drop-out point in the tubing. Constant injection through the hollow rod prevents paraffin deposition.

BrakeSol may be applied in cleaning the paraffin off of the formation. This has been accomplished by spotting the BrakeSol on the formation and leaving it for a time, then pressuring it back into the formation. It has also proved effective in frac and acidizing jobs where a well is being worked over.

Trained BrakeSol engineers are located in all parts of the oil country for the purpose of helping oil field personnel in the proper methods of treating their particular paraffin problems.

BrakeSol Treating Engineers.

Other Equipment - Services

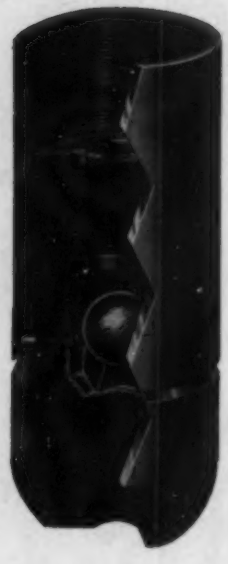
(121) Jet Gun Research

World headquarters for continuing research and development in the field of jet-shaped charges has been established on a 200-acre tract near Arlington, Texas.

The staff is headed by Blake M. Caldwell, president, and R. L. Robinson, manager of research and technical director.

Jet Research Center will utilize the experience and knowledge of men who are specialists in this modern method of perforating. Basic research will be combined with practical manufacturing techniques as Jet Research seeks to

DAY IN



LARKIN LEADERSHIP HAS BEEN EARNED

meet the expanding requirements of a petroleum industry that used nearly 3,000,000 jet charges for well perforating last year.

The center will be in a position to offer assistance to the industry in development and testing on any problem pertaining to the jet process of shaped-charge perforating.

Ample room for field testing and complete laboratory and manufacturing facilities make the Jet Research Center an ideal location for research, development, testing, and experimentation. Although located in the Texas countryside, JRC provides ample facilities for housing and entertainment. Visiting engineers and scientists may be housed at a comfortable lodge at the research center.

Jet Research Center, Inc.

(120) Battery-Powered Fire Truck

A new vehicle battery-powered fire fighting unit that can be ready always for instant use to combat small fires is now available through McKinley Corporation.

The "Insta-Pumper" is a complete unit, including 90-gal liquid tank, positive-starting electric motor that runs off any vehicle battery, self-priming pump, pressure indicator, switches, battery cables, 50 ft of hose and spray nozzle. It is perfectly suited to carry in a pick-up truck or other utility vehicle.

Entire pumping unit is automatically and remotely controlled by regulating the hose nozzle. Normal output is 7 gpm at 20-ft water heat, which is usually adequate to control small fires before they have had a chance to spread.

McKinley Corporation.

(122) New Tire Tested

More than a year's time and 1,000,000 miles of road testing and development experience are back of the new Goodyear Captive-Air Safety tire.

Thousands of tires were involved in the tests — on the company's own fleet of test cars, scores of individual cars, and busy taxicab fleets in various sections of the country. In only one case has an emergency tire change on the road been made. Even then, this change was proved to be unnecessary.

When Goodyear tire designers set out to achieve the ultimate in tire safety, for today's high-speed driving on superhighways and to overcome disabling stops in heavy city traffic, they quickly discarded several "crutch" tire ideas, and studied the time-proved principle of the double air chamber.

To achieve their purpose, they eliminated the slow-leak grommet from the LifeGuard blowout shield and added other improvements to make the

— AND DAY OUT

wells everywhere are safely and successfully cemented with Larkin Equipment

The preponderant use of Larkin Floating and Guiding Equipment is a natural result of its years of dependable performance. Experience brings confidence — and that's why thousands upon thousands of wells each year are cemented through Larkin Equipment.

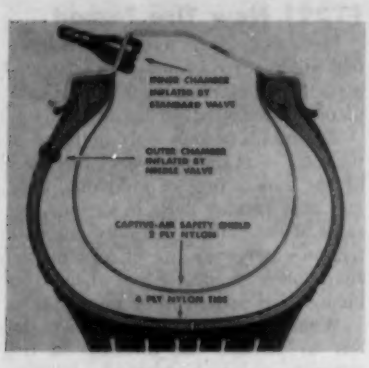
LARKIN PACKER COMPANY, INC.
WAXAHACHIE, TEXAS

LARKIN
...Through Your Supply Store

BY YEARS OF DEPENDABLE PERFORMANCE

shield serve as an airtight inner tire — or built-in "spare."

Then, they solved the problem of getting air into the outer chamber (the inner safety unit is inflated with the regular rim valve) by adopting the self-sealing rubber valve idea long used to inflate footballs and basketballs. This


INNER CHAMBER INFLATED BY STANDARD VALVE
OUTER CHAMBER INFLATED BY NEEDLE VALVE
CAPTIVE-AIR SAFETY SHIELD 2 PLY NYLON
4 PLY NYLON TIRE

valve was placed in the tire's sidewall near the regular rim valve.

Road-testing began. At first, deflated tires were run at 30 miles an hour for 20 miles, then for 60 miles at legal speeds. Finally a test driver kept going on a blown-out tire until 261 miles registered on the speedometer from the point of blowout. This is more than the entire distance of the Ohio turnpike — 241 miles.

Taxi fleets in San Francisco and Los Angeles, California, in Columbus, Ohio, New Orleans, Louisiana, and Erie, Pennsylvania, have rolled up approximately 1,000,000 test miles, with only the one stop for tire service.

Special tests centered on the sidewall valve to be sure it would retain air. One tire was equipped with 16 valves — 8 on each side — and operated without loss of air. In other tests the valves functioned perfectly at temperatures as high as 212 F and as low as 40 F.

To demonstrate the keep-going ability of the tires, after blowouts — the tires were run over spike plates, blown out with dynamite caps and slashed open with knives.

In each of these tests, although air escaped from the outer chamber, the tires kept going on the inner unit's captive air until the driver decided to stop.

Goodyear Tire & Rubber Company.

(114) Fresh-Water from Sea-Water Through Waste Heat

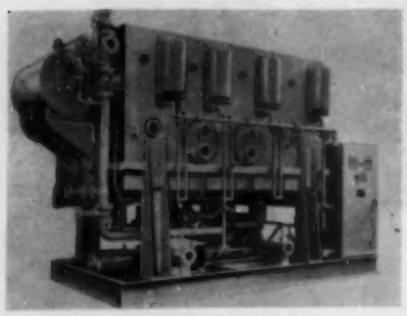
Cleaver-Brooks new waste heat evaporators transform sea water into fresh water at no fuel cost by utilizing waste heat from diesel engines or gas turbines. Five models with capacities 300 gph up to 2100 gph are now available.

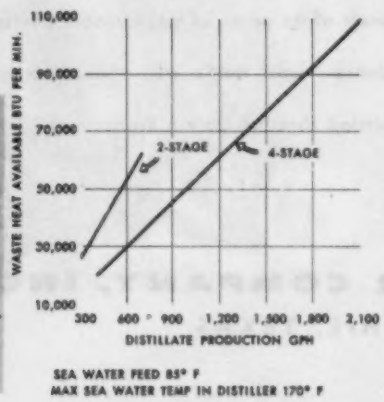
Here's how the evaporator works: Hot water from diesel cooling system circulates through heat exchangers carrying cool sea water. Heat is transferred to the sea water. The heated sea water is flashed into steam in the evaporator vacuum chamber which is below atmospheric pressure and is condensed on cooling coils. The evaporator produces fresh water in direct proportion to waste heat available. A 2-stage evaporator produces approximately ⅓ gph per 1 hp engine load; a 4-stage evaporator produces ⅔ gph per 1 hp engine load. The output graph indicates distillate production for waste heat available for sea water feed at 85 F.

The evaporator will find wide application on offshore drilling rigs where fresh water is essential for drilling mud makeup, drinking and bathing. Savings in providing fresh water aboard such rigs can amount to thousands of dollars over barging in water. The units are effectively used in oil fields where diesel engine power can be harnessed, for water injection on gas turbine installations, for production of fresh water at no fuel cost on diesel powered ships.

Major advantages of the new evaporators include reduction of scale formation because of low temperature, low pressure operation, labor-saving automatic operation and low cost production of fresh water by harnessing diesel waste heat.

Cleaver-Brooks Company.





(213) Splice Kit for Cathodic Installations

Moisture-proof splices for cathodic protection installations that can be insulated in less than 10 min and can be used with assurance even under water are now possible.

A new splicing kit introduced by Minnesota Mining and Manufacturing does the trick, the company says.

Designed for low-voltage applications in rectifier ground-bed systems, the new kit consists basically of a single-use plastic mold and an envelope of self-mixing "Scotchcast" insulating resin No. 4.

Called the "Scotchcast" splicing kit No. 90-B1, it makes possible complete encapsulation of the splice in liquid epoxy-type resin. The resin — a synthetic, thermosetting plastic — hardens into a permanent jacket, sealing out moisture and eliminating electrical leakage under even the most critical conditions.

It has been field tested by a number of major pipe line companies and has been used successfully in several rectifier ground-bed and offshore installations.

Company points out that, while epoxy resins are widely used as electrical insulation material in the manufacture of electronic components for critical applications, it previously has been impossible to mix and use them under field conditions. Two liquids are involved—a resin and an activator.

The "Unipak" container is a plastic envelope in which the epoxy resin and the activator are separated by a divider strip. The user simply pulls on the sides of the container breaking the divider and allowing the resin and activator to mix. Mixing is completed by kneading the container 30 or 40 times

until the different colored resin and activator achieve a uniform color blend, indicating thorough mixing. The corner of the container is snipped off and its contents poured into the mold. The resin then hardens by itself through chemical reaction and can be put in service almost immediately.

Unlike conventional potting compounds, the epoxy resin is claimed to stay hard permanently and not to soften even under the application of heat, pressure, or through aging. In addition, the resin, after curing, normally is unaffected by crude oil, petroleum, solvents, and most chemicals.

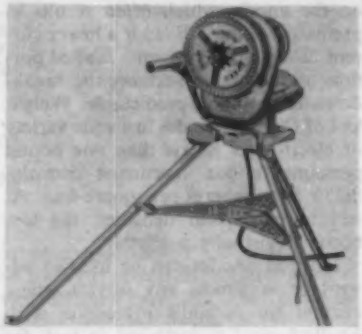
This "Scotchcast" splicing kit can be used on cables having outside diameters from 0.35 in. to 0.80 in. for the branch and 0.50 in. to 0.80 in. for the feeder, and can be used on splices made with all conventional connectors.

Minnesota Mining and Manufacturing Company.

(261) Power Tools for Pipe Threading, Cutting

During the past year, Ridge Tool has added another power drive to its line of Ridgid machines for pipe threading, cutting, and reaming. Previously on the market and widely in use are the 400A Power Drive and the 500A Pipe and Bolt Threading Machine, both equipped with the newly developed Ridgid Speed Chuck which operates on a new, more effective principle.

Designed for operation of hand pipe tools, the Ridgid 200 Tripod Power Drive is a small, lightweight power unit equipped with an integral, folding metal tray, so that the entire device is all one piece — no extra parts to misplace or bother with. Legs and tray fold in compactly and chain for easy carrying by a built-in handle. It sets up easily by spreading legs and pushing down the tray, which besides its usefulness as a



handy place for tools, makes the tripod extra rigid and sturdy. There's no leg in front to obstruct swing of die stock handles.

The 200 is powered by a specially designed motor having extra-large brushes and longer commutator, giving it ample power for its normal capacity of ⅛-in. to 2-in. pipe or conduit or ¼-in. to 2-in. bolts, but also plenty for geared tools to 12-in. Its Ridgid-designed Speed Chuck is guaranteed by the manufacturer to grip any pipe, conduit, or rod tightly, forward or reverse, jaws closed or released, easily by turn of hand wheel. Centering device at rear, tightened by turn of cam, automatically holds pipe and revolves with it.

Problem of how to flood dies with cutting oil while threading pipe with hand-die stocks is solved by the new Ridgoilr (Ridge Oiler). It is easily portable, consists of a removable 15-in. wide chip pan in an oil reservoir with carrying bail, from which a screened hose connects with a hand-operated pump-gun. Placed under the work, the device catches oil, chips, and cut-offs, keeping floors clean while allowing an endless stream of clean oil on dies, cooling, and protecting them. More than 97 per cent of the oil is saved and used over and over, savings that quickly pay for the device.

The Ridge Tool Company.

(262) Diesel Pile Hammer Demonstrated

A new internal-combustion pile hammer was unveiled at a demonstration recently, arranged by McKiernan-Terry.

The diesel-powered hammer, completely self-contained and requiring neither boilers or air compressors, is light, mobile, versatile, and compact. This is said to be the first internal-combustion pile hammer to be built by an American firm.

Unit was the McKiernan-Terry DE 30, a completely self-sufficient pile hammer with built-in fuel and lubricant reservoirs. A 3000-lb ram delivered 45 to 55 strokes per minute with an average force per blow of 18,000 ft-lb. Operational tests recently concluded have shown that this hammer operates most efficiently with 1 to 2-ton piles at a bearing of from 40 to 90 tons.

Operation of the unit is simple. The hammer is worked by a single load line from a 30 to 35-ton crawler or truck

For complete information, write:
The INGALLS Shipbuilding Corporation
Birmingham, Alabama

13 SIZES

JENSEN JACKS

HAVE BROKEN RECORDS FOR ECONOMY AND DEPENDABILITY FOR THE PAST 36 YEARS

We'll be glad to show you how JENSEN JACKS can break your own production cost and service records. Write us or see your JENSEN Dealer.

JENSEN JACKS

JENSEN BROS. MFG. CO., INC.
Coffeyville, Kansas, U.S.A.
Export Office: 25 Broad St., New York City

crane. It is started merely by lifting the ram with the load line and allowing it to fall. Once started, the hammer operates at a speed and stroke determined by the pile resistance; the greater the resistance the longer the stroke, and the greater the energy delivered to the pile. The diesel hammer delivers its maximum energy when the driving is most difficult.

Design of the McKiernan-Terry diesel hammer offers a number of features that are extremely desirable from the standpoint of providing easy, economical, trouble-free operation. DE 30 design features a forced-lubrication system that provides a continuous flow of lubricant to the wearing surfaces. High wear surfaces are plated with porous chrome for long life. Both cylinder and ram are each of one piece construction and all parts subjected to high-shock stresses are made of special alloy steels to reduce the possibilities of breakage.

McKiernan-Terry Corporation.

(211) Improved Impressed Current Anodes Developed

In 1952, the Duriron Company undertook the development of anodes for impressed-current cathodic protection of underground structures.

Since that time, Duriron anodes have been tested extensively to determine the services for which they are applicable. In the past 12 months, more than 10,000 Duriron anodes have been installed in almost all possible service conditions and have been found far superior to other types of anodes in many applications.

Duriron possesses a dense, homogeneous structure showing uniform properties throughout. It cannot absorb moisture with a resultant loss of strength and electrical properties. It is a good electrical conductor, which assures uniform current distribution to a continuous or near-uniform environment. This minimizes selective attack on the anode, which often results in premature failure. Even if a heavy current discharge occurs on a limited portion of the anode surface, the breakdown is slow and predictable. Weight loss of Duriron anodes in a wide variety of electrolytes is less than one pound per ampere-year at current densities below five amperes per square foot. At still lower current densities, the loss becomes virtually negligible.

Duriron anodes can be used to advantage in almost any service where current for cathodic protection is to be discharged to earth, or, in fact, for making electrical contacts to the earth for any purpose. A vast number of Duriron anodes have been applied in ground bed installations under very wide varieties of conditions, the most important of which include: (1) Direct comparison to graphite in well-packed coke breeze backfill, (2) in coke breeze backfill either insufficiently compacted or not completely surrounding the anode, (3) in special soils known to be difficult because of high sulfate or salt content, (4) in swamp areas where backfill was not possible, (5) under conditions where backfill was intentionally omitted, and (6) where anode beds were submerged in water at river crossings.

Installation is in all cases as simple and in many cases much simpler than the installation of other anode materials for the same service. Backfill is not a necessity with Duriron.

The Duriron Company, Inc.

Type	Size	Effective area, sq. ft.	Approx. weight pounds	Remarks
B	1 in. diam x 60 in.	1.4	14.0	Suitable with backfill in high-resistivity soils. Driven connection.
C	1½ in. diam x 60 in.	2.0	25.0	Suitable with backfill in medium-resistivity soils or without backfill at very low current densities. Driven connection.
CA	1½ in. diam x 60 in. (with cast-in insert one end)	2.0	25.0	Two anodes can be connected with stud to make one 120 in. long anode. Suitable as bare anode or with backfill at low current densities.
D	2 in. diam x 60 in.	2.6	46.0	For more severe ground bed applications, either bare or with coke breeze backfill. Driven connections.
E	3 in. diam x 60 in.	4.0	115.0	For occasional application in exceptionally severe ground bed applications. Driven connection.
F	1½ in. diam x 12 in.	0.4	5.0	Numerous small anodes on common header wire for horizontal installation. Spacing between anodes will vary according to current requirements.

(127) Truckers Snatch Block

The LeBus Truckers Snatch Block is designed for use on all types of heavy trucking, construction, and rigging work.

This block utilizes the patented LeBus Locking Swivel Pin, which works on the spring-ball safety latch principle. The pin is made with easy fitting and long-lasting acme thread, contourly machined and secured to prevent any loss from vibration.

LeBus engineers have placed a great deal of emphasis on strength, safety and ease of operation in the construction of this block. Each block is constructed of only the highest grade of alloy and carbon steels.

Snatch blocks are available in six sizes from a 4⅞ in. through 10½ in. This block can be furnished either with the hook (as pictured), the new LeBus opening and closing safety clevis hook, full swiveling shackle, or tail broad assembly. They are also available either with roller bearings or bronze bushings. The working load capacity ranges from 8 tons to 45 tons with an ultimate hook capacity of 35,000 to 130,000 lb.

LeBus Rotary Tool Works, Inc.

(116) Labor Time Reduced with Aluminum Pipe

A new aluminum line pipe for oil field use that provides outstanding economy in installation cost and time is announced by Kaiser Aluminum.

Employing quick-connecting, detachable couplers of new design, Kaiser Aluminum petroleum pipe has been installed, and later taken up, by regular oil field crews in one-sixth the time required for standard steel pipe.

Installation experience has shown that one mile of the new aluminum petroleum pipe in 4-in. size can be made with 101 less man-hours and at a cost saving of $219 over steel pipe, according to Kaiser Aluminum engineers.

TABLE 2. Compressive strength — Psi.

Diameter	Kaiser aluminum pipe weight per foot	Steel pipe weight per foot
2 in.	0.395 lb	3.65 lb
3 in.	0.70 lb	7.57 lb
4 in.	1.05 lb	10.79 lb

TABLE 1. Thickening time, welded aluminum pipe.

Operation	Welded Aluminum Pipe			Steel Pipe		
	Man-hours	Rate	Cost	Man-hours	Rate	Cost
Loading	3¼	$2.20	$ 7.15	10 2/3	$2.20	$ 23.46
Stringing	5/6*	1.82	1.52	1 2/3*	1.82	3.03
	1 2/3	2.20	3.65	3 1/3	2.20	7.33
			$ 5.17			$ 10.36
Connecting	3	2.20	$ 6.60	43 1/3	2.20	$ 95.33
Disconnecting	5	2.20	$11.00	26¼	2.20	57.75
Pick-up (reloading)	1 1/3*	1.82	2.42	7¼*	1.82	13.20
	5 1/3	2.20	11.73	29	2.20	63.80
			$14.15			$ 77.00
Total	20 5/12		$44.07	121½		$263.90

* Truck driver time.

Comparative data for the installation of 4-in, drilling-rig supply pipe are summarized in Table 1.

Three different couplers are now available for use with Kaiser Aluminum petroleum pipe. They are manufactured by Gateway Engineering Company, Chicago, Illinois; Industrial Coupler Company, Spokane, Washington, a division of Precision Casting Company, Inc.; and Warren Manufacturing Company, Riverdale, New Jersey.

All three of the couplers are made of cast aluminum and share the basic design principle of engaging the flared, or flanged, ends of the pipe sections with O-ring or molded-type neoprene gaskets seated in the coupler bodies by means of threaded locking nuts.

Simplicity and flexibility characterize each of the couplers. The locking nuts require only hand pressure with a 6-in. spanner wrench to assure leakproof connections at pressures from 0 to 1000 psi in both liquid and gas service. Elbows, tees, and other standard fittings are also available from the coupler manufacturers.

Kaiser Aluminum petroleum pipe is available in diameters of 2, 3, and 4 in. in 30-ft lengths. Both inside and outside surfaces are clad with a special aluminum alloy to provide increased resistance against corrosion.

The pipe has a design pressure of above 1500 psi, with a guaranteed test pressure of 1000 psi and a recommended operating pressure of 500 psi, providing a nominal safety factor of 3 to 1.

Comparative weights of Kaiser Aluminum petroleum pipe and API Schedule 40 steel line pipe, which is commonly used for oil field supply lines, as listed in Table 2.

Kaiser Aluminum & Chemical Corporation.

(268) New Tee and Ell-Type, Gate-Valve Line Blinds

Vernon Tool, Greenwood Valve Division, announces a new Tee and Ell-Type, Gate-Valve Line Blind.

These line blinds are designed to simplify piping and manifold installations. Use of these valves permits a much more compact piping arrangement and eliminates the need for surplus tee and ell fittings. By eliminating additional flanges, the danger of leakage is reduced.

Greenwood Gate-Valve Line Blinds operate on an entirely new engineering design. They have no bolts to loosen and require no lifting of plates whatsoever on the part of the operator.

Operating on the gate valve principle, the rising stem raises the blind plate from the valve body into line with a machined carrier track incorporated in the top of the valve yoke. Here the blind plate merely slides off the stem onto the carrier track, and the other blind or spectacle plate is then slid onto the valve stem and lowered into position.

By their extreme simplicity, Greenwood Gate-Valve Line Blinds are said to offer the ultimate in dependability and economy for a positive shut-off valve. These gate-valve line blinds are available in sizes 6, 8, 10, and 12. Body, yoke, solid wedge and open wedge are regularly constructed of cast steel. Other materials are available on special order.

Vernon Tool Company, Ltd.

(247) Impenetrable Sealing Visible Wedge Valve

Three new styles of Hamer Visible Wedge Valve, a tee, horizontal ell and vertical ell, have been placed on the market by Hamer Valves. All have the

. . . from ⅓ HP to 300 HP . . . from 20 bbls to 25,000 bbls . . . from 200' to 10,000' and more . . . Yes, a REDA will do that pumping job BETTER . . .

Reda Pumps are used as original equipment, or replacement equipment, because they produce at a lower cost per barrel of fluid. Whether it's large volumes from shallow depths, or modest volumes from great depths, Reda Pumps provide operating savings.

IMPROVED DESIGN:

Constant research and design improvement are responsible for lengthened operating life, corrosion resistance, low labor cost per barrel of fluid produced.

IMPROVED EFFICIENCY:

Greatly improved overall efficiencies have improved Reda performance as much as 25%; a substantial operating saving.

If you have a pumping problem, our engineering staff is always ready to assist you. Phone or write:

THE SIGN OF QUALITY

SUBMERGIBLE REDA PUMPS

REDA
PUMP COMPANY
BARTLESVILLE, OKLAHOMA

same center-to-face dimensions as standard tee and elbow pipe fittings.

These three new body styles, along with a straightway model (previously introduced) provide all of the configurations necessary for modern piping and piping manifold requirements. All four valves incorporate the impenetrable sealing action of the line blind with the simplicity of operation found in a gate valve.

One glance at the valve is all that is required to determine whether the line is full open or full closed. A precision metal-to-metal fit on the wedge and seats, augmented by dependable seal rings, provides a foolproof line shut-off.

Outstanding features of the valves are their stability, safety and simplicity. They are absolutely rigid, no line movement is necessary to open or close the units. The operator has complete control of the wedge at all times and there is no hand lifting necessary when reversing the wedge. The handwheel operation permits opening or closing a line in a minimum of time.

Hamer Valves, Inc.

(214) Solenoid and Air Valves

Hanna Engineering has announced development of a new series of solenoid and master air valves. These valves are used for three and four-way air operation, and are available in sizes of ¼, ⅜, ½, ¾, and 1 in.

Hanna Flo-Line Valves are used for controlling air cylinders and other air-operated devices. Dependable performance, safe operation, easy maintenance, and clean-cut design are advantages offered by these valves.

Dependable service is claimed to be assured by seals that eliminate damage from external grit and moisture. Few moving parts and materials such as aluminum, brass, and stainless steel were selected for lasting performance. The bubble-tight aluminum spool is sealed positively by "O" rings. Parts subject to wear are instantly replaceable without the possibility of assembling the valve incorrectly.

Flo-Line Solenoid Valves have a built-in junction box for convenient piping or conduit. Coils meet the standards of Underwriters Laboratories.

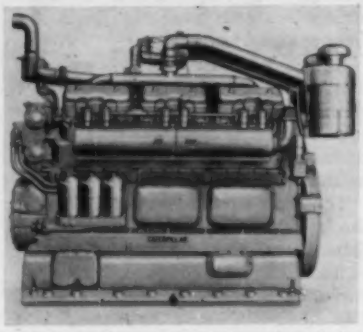
Hanna Engineering Works.

For more information on this Equipment see page E-20a

(287) Heavy-Duty V-Type Engines Announced

Two heavy-duty V-type engines have been recently announced by Caterpillar Tractor. Capable of producing up to 650 hp (maximum), the new units are available in turbocharged, roots-blown, naturally aspirated and spark-ignited versions.

The new 8 and 12-cylinder D375 (Series D) and D397 (Series D) Engines are of four-cycle design, as were their predecessors, the D364, D375, D386, and D397. Principal differences between the new engines and the former models are in the cylinder heads, exhaust manifolds, method of supercharging, and in the case of the spark-



ignited engines, the fuel used and the method of igniting it. Inherent advantages of the former models have been retained.

The new turbochargers enable these engines to produce increased power with less fuel by using the energy of exhaust gases. Improved engine breathing ability, the result of a new cylinder head design, allows the new units to take full advantage of the extra air made available by supercharging.

The new spark-ignited engines produce 400 and 267 hp respectively, us-

	Industrial			Elec. Set	Marine	
	Max. hp at 1300 rpm	Inter. hp at 1300 rpm	Cont. hp at 1200 rpm	kw 1300 rpm	Inter. hp at 1225 rpm	Cont. hp at 1225 rpm
D397						
Turbocharged	650	575	500	350	550	500
Roots blown	—	520	480	315	500	450
Naturally aspirated	—	415	360	250	—	—
Spark ignited	—	—	400	—	—	—
D375						
Turbocharged	430	375	325	225	300	300
Roots blown	—	350	302	200	300	300
Naturally aspirated	—	275	238	165	265	235
Spark ignited	—	—	267	—	—	—

ing low-cost natural gas as fuel. Outstanding features are a 10 to 1 compression ratio, a low-tension magneto ignition system, and "deep-domed" pistons. The ignition system uses a magneto to feed low-tension current to high-tension transformers located near the spark plugs. This keeps the high-tension leads very short for a hot, positive spark and eliminates arcing.

The engines are expected to find wide application in areas where natural gas is available. Some of the jobs for which they are especially suited are powering pipe line pumps, sewage disposal plants, cotton gins, municipal pumping stations, and stationary irrigation systems.

Considerable attention has been given to making the new D397 and D375 Engines highly compact and easy to install.

Caterpillar Tractor Company

(290) New Short Stroke Engine Weighs 86 Pounds!

New, single-cylinder, 4-cycle, air-cooled, gasoline engine—Model AJ—has been announced by Onan.

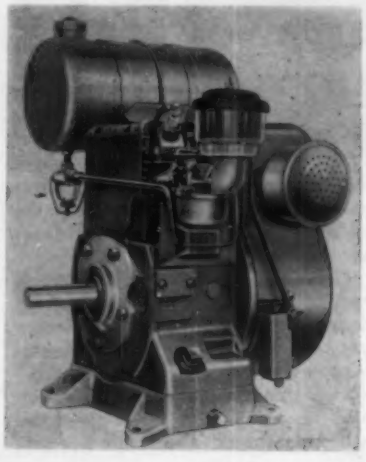
For the first time, its high-quality, air-cooled electric plant engine, Model AJ, is offered to the mass engine market at competitive prices. Claimed to deliver more horse-power hours per dollar, engine was developed primarily as the prime mover for the firm's line of lightweight, portable electric generating plants.

Basic requirements of this new electric plant engine were exceptionally severe.

The Onan Model AJ is a single-cylinder, air-cooled, 4-cycle, gasoline-powered engine developing 5.5 hp at 3600 rpm. Weighing only 86 lb, this compact, powerful little engine has a 2¾-in. bore; 2½-in. stroke; 14.9 cu in. piston displacement and a compression ratio of 6.25:1.

Optional equipment includes: Rotating Stellite-faced exhaust valve and solid Stellite exhaust seat insert; mounted fuel tank, fuel pump, oil pump, recoil pull-rope starter, a 6-volt or 12-volt Bendix starter . . . and Vacu-Flo Cooling, Onan's new, exclusive cooling sysetem for Onan air-cooled engines.

D. W. Onan & Sons, Inc.



(32) Hydraulic Fluid Is Fire-Resistant

An economical new "snuffer"-type hydraulic fluid whose fire-resistant qualities prevent it from burning on contact with flames, heated metal surfaces, or molten metal, has been introduced by Shell Oil under the trade name Irus Fluid 902.

A special formulation of water, petroleum hydraulic oil and emulsifying agents, the fluid is particularly suitable for use in industries where hydraulic leaks or line ruptures would be immediate fire or explosion hazards.

Irus Fluid 902 eliminates the possibility of combustion by releasing its water content as a protective steam blanket to quench fire. This "snuffer" action reduces local temperatures and displaces oxygen from the immediate area; in most cases, the remainder of the hydraulic fluid will not support its own combustion. A further advantage is that the oil will continue hydraulic action should the water be dissipated for any reason.

Despite the water in its composition, the fluid possesses all of the petroleum hydraulic oil characteristics vital to proper functioning of hydraulically operated machinery. It is non-corrosive on ferrous and most non-ferrous metals; it is compatible with normal system components; film strength provides good antiwear and antiscuff protection for closely fitted machine parts; high shear rate viscosities assure maximum hydraulic efficiency over a wide range of temperatures. And the fluid is colored a bright yellow to permit instant recognition and location of possible leaks, resulting in a sharp reduction of fluid make-up rates.

According to Shell technicians, Irus Fluid 902 replaces any conventional mineral or synthetic oil hydraulic system, and can be installed without modification of lines, pumps, valves, or cylinders. Preparation of existing systems prior to installation of the fluid requires only thorough cleaning to remove previous materials.

Shell Oil Company.

(310) Improved Traction-Type Fluid Drive

A new, improved traction-type Gyrol Fluid Drive for general industrial application is now available from American Blower.

Designated Size 126 Type T, the basic unit is designed for industrial use with internal combustion engines as a fluid power transmission for mobile material handling vehicles and construction equipment. Power rating in these applications is 25 to 85 hp, depending upon drive speed. When modified by installation of a flexible coupling half on each end of the fluid drive, the new unit is well suited to constant speed electric motor applications for driving production and processing equipment, machine tools, conveyors, and other material handling installations. As a motor-driven unit, the Size 126 fluid drive is rated 7½ to 15 hp for 1200-rpm drive speed and at 25 to 50 hp for 1800 rpm.

This new fluid drive is of die-formed, resistance-welded construction. The runner and impeller assemblies ride on two ball bearings that take the internal thrust of the unit, making the entire fluid drive a rigid assembly. Both bearings are readily accessible for inspection and maintenance.

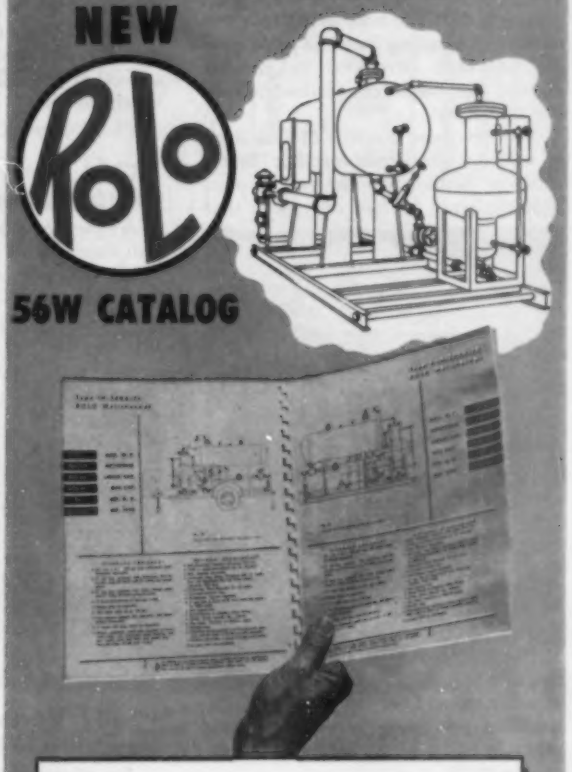
The oil seal used in the Size 126 unit consists of a carbon ring riding on a Meehanite iron ring, lapped to a close tolerance to give a flat surface. All O-rings are fabricated of an oil-resistant silicon rubber, which is recommended for high-temperature service. The entire fluid drive is dynamically balanced following final assembly to assure smooth running conditions at operating speed.

Dimensions for the basic unit are 7⅛ in. over the shaft and 14 15/16 in. OD. Overall length for the electric motor arrangement is 10 13/16 in.

Like other Gyrol Fluid Drives, the new Size 126 provides shock isolating, smooth starting, and torque limiting characteristics for a variety of industrial drive applications.

American Blower Corporation.

SEND FOR YOUR COPY OF THE NEW ROLO 56W CATALOG



Right off the press, the 56W Catalog *completely* describes and illustrates the *new* ROLO WELLCHECKERS with ROLOCHECK Meters.

Typical money-saving applications of these efficient separating and metering units are discussed and illustrated, and full pages are devoted to each standard model WELLCHECKER.

The *Modern* way to produce oil is through ROLO WELLCHECKERS. Let the 56W Catalog tell you about it. Mail in the coupon *today!*

CRUDE OIL METERING SPECIALISTS

ROLO MANUFACTURING COMPANY

P. O. Box 6763, Houston 5, Texas

BRANCHES: TEXAS—Corpus Christi; Midland; Kilgore; Wichita Falls • Tulsa • Lafayette; New Orleans • Los Angeles; Bakersfield • Casper • Mt. Vernon, Ill. • Caracas, Venezuela (PETICON).

EXPORT OFFICE: R. S. Stokvis & Sons, Inc., 17 Battery Place, New York

ROLO MANUFACTURING CO.

P. O. Box 6763 • Houston 5, Texas

Please send a copy of Catalog 56W to

NAME_____

COMPANY_____ POSITION_____

STREET ADDRESS_____

CITY_____ ZONE___ STATE_____

6489

(303) Siamese Hose Used in LPG Delivery

A new dual-line hose to improve the method of handling liquefied petroleum gas has been developed by Hewitt-Robins, manufacturer of industrial rubber products.

The new hose consists of two lines of different size joined together "Siamese-twin" fashion to form a single unit. It is designed for use on trucks that

deliver LPG fuel to homes and industrial consumers. In the past, these trucks have been equipped with two separate hose lines—one to feed the liquefied gas under pressure and the other to carry vapor back to the tank on the truck.

Joining the two lines together by means of a rib of rubber results in a hose unit that is easier to handle, has longer life, saves wear and tear on meters and pumps caused by pressure differential, eliminates tangling, and speeds up delivery of the LPG.

The hose is available in lengths up to 125 ft. The gas-carrying line has an inside diameter of ¾ in. and the vapor line ½ in.

Hewitt-Robins Inc.

(220) Check Valve for Liquid Lines

A new, simplified, flanged, silent check valve for control of water hammer has been developed by Williams Gauge. This Williams-Hager Silent Check Valve is recommended by the manufacturer for control of water hammer for all types of hot or cold liquid service—including water, oils, gasoline, acids, chemicals, salt water, brine—where flow is constant.

The unit was developed to provide a lower cost Williams-Hager Valve without sacrificing water hammer control and durability features. It is available in sizes from 1 in. to 10 in., faced and drilled in accordance with A.S.A. standard for pressures ranging from 125 to 2500 lb. The valve can be furnished with special flange facings, including large male and female, ring joint, and large tongue and groove.

Among the design features that were originated by Williams Gauge Company in 1929 are the removable and renewable disc and seat and non-wear conical spring. The valve can be used in any position.

The Williams Gauge Company, Inc.

(225) New Piping Compensator

A new piping compensator by Rotherm Engineering is made to take care of all strains in steam, air, hydraulic, and refrigeration pipe lines.

Pipe lines on the end of large paper dryers, for expansion, aboard ship where there is considerable piping strain, for all earthquake piping, for setting of buildings and large storage tanks.

Unit consists of two ball seats individually spring seated so that movement can be had in all directions, including unlimited traverse expansion. All internal parts will not adhere to the metal.

Compensators are available in sizes from ½ in. to 6 in. to any suitable length.

Rotherm Engineering Company, Inc.

(230) Vane-Type Flowmeter

An efficient, simply designed vane-type flowmeter for air or gas flow, No. 1050, is offered by the instrument division of Scully-Jones and Company.

This flowmeter is designed for a constant pressure drop across the meter and may be used for indicating, controlling, signal alarm, safety shutoff, sequence starting or shutdown, and similar applications.

Flowmeters are made in three standard body sizes with standard scale diameters of 4½ and 6 in.

Scully-Jones and Company.

(235) Epoxy Resins For Coatings

A new series of epoxy resins developed specifically for corrosion-resistant surface coatings is announced by Bakelite.

Ample resources and facilities provided by various Union Carbide divisions have expanded epoxy production capacity to meet demands from the surface coatings field as well as other industries.

Currently there are four products available. These resins can be formulated into high-quality air-drying or baking finishes for steel, aluminum, zinc, tin plate, and wood. Both resins offer excellent adhesion and resistance to weather, salt spray, corrosive fumes, and chemicals. Properly formulated coatings based on the new resins can be applied to most surfaces by brush, spray, roller, flow, or dip-coating. Once on, these coatings resist efforts of wear, abrasion, and impact to get them off.

Two of these products are designed to react with amines, polyamides, and urea-formaldehyde resins. One is in solution for easy handling; the other is a solid resin product. Two others, though primarily designed to esterify with vegetable oil acids, also undergo all the usual epoxy reactions.

Scuff-resistant floor varnishes, indoor enamels, appliance coating primers, and tank linings can be prepared economically with these resins. Tough coatings for metal, wood, as well as paper, foil and flexible film can be made. Possible uses are collapsible tube finishes, electrical insulation varnish, and masonry paint.

Bakelite Company, a division of Union Carbide and Carbon Corporation.

(225) New Pipe Bender

Pedrick Tool & Machine has developed a new building machine that bends both ends of a pipe, tube strip, or shape simultaneously.

It comprises two machines each with a motor and relay control, mounted on a base that is adjustable as to centers, and is controlled from a single starting button. One unit bends clockwise and the other counter-clockwise, but both units may be made to bend clockwise or counter-clockwise if it is desired to bend offsets. One unit may be made to bend 90 deg and the other 45 deg or any curvature up to 180 deg. The centers are adjustable either manually or by means of a lead-screw driven by a motor, and the machine may or may not be provided with an ejector.

When fully equipped, the Pedrimatic is said to be the first practical, simple machine that can be made fully automatic, taking stock from a hopper and delivering it to a conveyor in finished condition without an operator. Its primary use is in bending two right angles in the same plane simultaneously. It can also be used to bend closed curves such as rectangles of four right angles or polygons. For example, this comprises hexagonal or octagonal frames made of round tube or bar stock. This machine may be either manually controlled or automatic.

Pedrick Tool & Machine Company.

(270) Non-Skid Tread Plate

A non-skid abrasive aluminum tread plate that provides sure footing even when covered with oil, grease, or water, has been placed on the market by Alcoa.

The slip-proof abrasive plate is designed for such critical items as bus steps and aisles, marine and printing press catwalks, military gun mounts, passenger trains, and truck and trailer floors.

Product is rolled from ingot by a method that provides a fused aluminum abrasive oxide on one surface of the plate. The layer of abrasive is metallurgically bonded to the aluminum plate. In welding, for instance, the abrasive layer does not separate from the plate.

The non-skid surface has proved valuable in preventing slippage on trucks carrying wet cargoes, at industrial locations where oil or ink may collect on floor surfaces, on military and civilian bridge walkways, in food processing plants, and sewage disposal units. In short, wherever dangerous slipping hazards exist, abrasive aluminum tread plate means sure-step safety, the manufacturer says.

The plate is being rolled at Alcoa's New Kensington, Pennsylvania, works.

Aluminum Company of America.

(285) Cold Galvanizing Compound Repairs Damage

Drygalv cold galvanizing compound, a new product that is claimed to prevent rust, protect iron and steel surfaces, and to be ideal for repairing damaged galvanizing has been placed on the market by American Solder & Flux.

The product, which is applied like paint either with brush or spray gun, produces a coating with a high proportion of metallic zinc — approximately 95 per cent in the dried film. This coating affords the same protection as galvanizing.

Drygalv is non-toxic, dries to the touch in 15 to 30 min and can be second coated or painted in 8 hr. It will withstand temperatures up to 392 F for a limited time so it can be used in manufacturing processes where high temperatures are necessary.

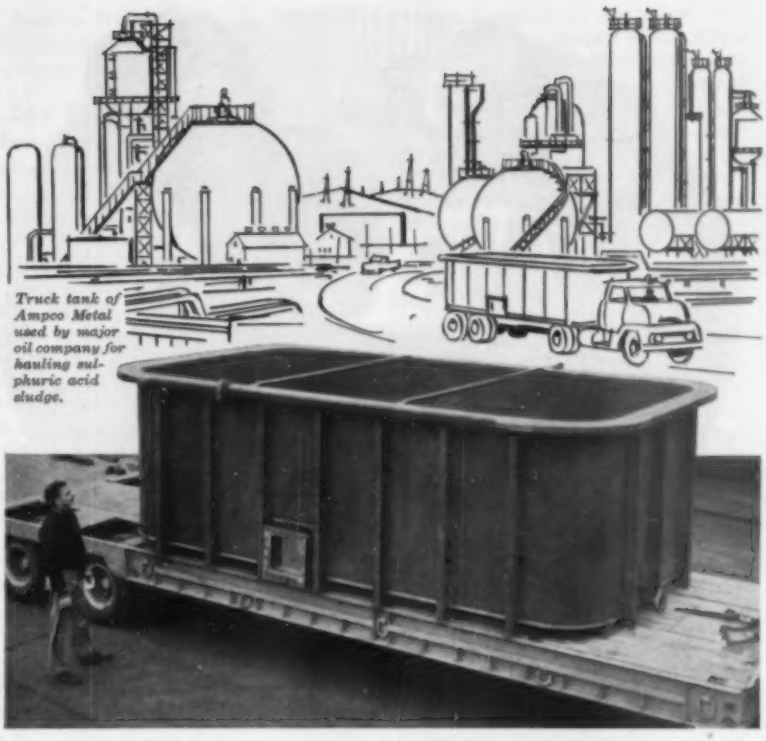
American Solder and Flux Company.

(315) Big Gas Engine Developed

A new 115 "working" horsepower gas engine designed to handle easily the heaviest oil field assignments has been introduced by Ajax Iron Works.

The Ajax DP-115 delivers 15 per cent more power, at greater fuel savings, than the largest engine previously offered by the company. Bore is 13¼ in., stroke 16 in.

This engine maintains an essentially flat torque curve, it is stated, delivering required horsepower to operated pumps or other equipment over a wide speed



Truck tank of Ampco Metal used by major oil company for hauling sulphuric acid sludge.

Handles 35% Solution of Hot Sulphuric Acid Sludge

Truck tank...made from Ampco Metal Grade 8 plate...resists corrosion

Ampco Metal resists corrosion, erosion, and cavitation-pitting caused by...

Boiling sulphuric acid (up to 50%)

Hot concentrated caustic solutions

Fatty acids

Hydrofluoric acids

Abrasive solids in suspension

Other problem liquids and abrasives

Ampco Metal has exceptional resistance to the destructive attack of many alkaline and acid media.

That's one reason why this aluminum-bronze alloy is used in fabrications like the truck tank shown here; in pipe, fittings, and other forms.

There are other reasons, also:

(1) Ampco Grade 8 can be readily sheared, bent, formed, or deep drawn.

(2) It is easy to weld with Ampco-Trode* by the metal-arc, carbon-arc, MIG or TIG processes.

(3) It possesses high impact and fatigue strength.

You can get Ampco Metal in sheet, plate, extrusions, sand and centrifugal castings, pipe fittings, fasteners, tubing, pumps, valves, etc.

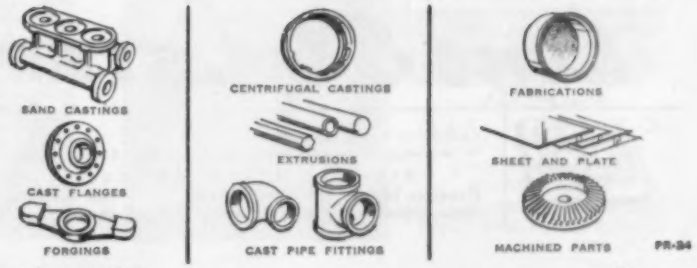
Ask your Ampco field engineer for further facts — or write us. *Reg. U. S. Pat. Off.

AMPCO METAL, INC.

Dept. PE-7, Milwaukee 46, Wis. • West Coast Plant: Burbank, Calif.

AMPCO®

THE METAL WITHOUT AN EQUAL



PR-34

"...thinks he's the core catcher."

There's no catching up with the demand for oil. That's the reason Lone Star Steel Company crews work day and night . . turning out API casing, tubing and line pipe for our friends in the oil business in the busy Mid-Continent area.

Lone Star pipe mills operate a never-slackening schedule for the personal convenience of Joe Roughneck, heart of the oil industry. Joe symbolizes the colorful, rugged individualists . . in the field and heading companies . . who have made the petroleum industry great. Lone Star is Joe's close-at-hand API pipe supplier.

Neighbor, wherever you are, specify Lone Star . . and we both get a good deal.

Lone Star STEEL COMPANY

LSS

EXECUTIVE-SALES OFFICES
W. Mockingbird Lane at Roper • P. O. Box 12226 • Dallas, Texas

DISTRICT SALES OFFICES
Houston, Texas | Midland, Texas | San Antonio, Texas
Tulsa, Oklahoma | Wichita Falls, Texas | Shreveport, La.

range. Speed is variable to meet operating conditions. Recommended speed range is 200 to 360 rpm.

Directional porting of cylinder intake ports is a design feature. This sweeps the maximum amount of exhaust gases from the cylinder by accurately targeting incoming gases, thus achieving exceptional scavenging efficiency. Other noteworthy features are thermo-syphon cooling, dual air filters for the combustion chamber, and shorter overall length and width. Gas injection equipment is optional.

Ajax Iron Works.

(30) Aerosol Spray Treats Burns

A new push-button spray bomb that both treats burns and protects the skin with a cooling emollient film has been announced by General Scientific Equipment.

Called G-63 Burn Relief Spray, this new product contains analgesic agents to alleviate pain and hexachlorophene to preclude possible secondary infection. It promotes rapid resorption of abnormal fluids in the afflicted area, resulting in reduction of painful swelling. The invisible film deposited by the spray isolates the burn and keeps skin moist and soft; it eliminates the need for bandages or dressings.

The compact aerosol bomb container makes it practical to keep a can of G-63 handy for immediate use wherever the hazards of heat, acid, or chemical burns are present. G-63 may also be used for the treatment of sunburn, scratches, chapped skin, insect bites, and other minor skin irritations.

General Scientific Equipment Company.

(31) New Line of Welding Regulators

Air Reduction has announced availability of a new line of low-priced, inverse-type oxygen and acetylene pressure regulators. Known as the Airco Series 8000 Regulators, they are designed to meet the needs of the smaller metal fabrication shops, where initial costs are a factor.

These regulators are compact in design—the two gage-type measuring 4½ in. by 4½ in. and weighing 2 lb, 4 oz, and the single-gage regulator measuring 3½ in. by 5½ in. and weighing 2 lb, 1 oz.

The regulator body is a machined brass forging and the spring case is a zinc die casting protected by a clear iridite finish for increased corrosion resistance.

For maximum readability, the brass pressure gages have crowned, clear crystals.

Other features of the new Airco

8000 Series Regulators are: molded rubber diaphragm with fabric insert for strength; relief valves on oxygen regulators; reversible nylon seat; easy accessibility to internal parts — no pressure seals to break when servicing; and a rugged, porous, tin-plated metal filter.

Air Reduction Sales Company, a division of Air Reduction Company.

(33) Portable LP-Gas Tank

Master Tank & Welding has announced production of the "Field Server," a portable butane-propane refueling tank for use on the farm, as the latest addition to its line of LPG tanks and equipment.

The "Field Server," mounted on two standard 15-in. wheels and with heavy-duty axle and tongue welded to the body of the tank, is easily "spotted" by truck, tractor, or automobile for hauling from one part of the farm to another. Designed to be left on any part of the farm where the farmer desires to refuel his equipment, it eliminates the necessity for moving heavy, cumbersome equipment back and forth to a central refueling point. The "Field Server" is in place and equipment refueled in a matter of minutes—another reason LP-Gas is the most convenient and economical fuel for use on the farm.

Unit is available in 250, 300 and 500-gal capacities.

Master Tank & Welding Company.

(36) Magnetic Tape Handler

Increased reliability for digital computing and data processing systems is provided by Key Electric's new Model 101 digital magnetic tape handler.

Magnetic amplifier reel servos provide improved dependability, greater power output, and smaller size than the vacuum tube amplifiers they replace. In this new design, depth behind the panel has been reduced to 9 in., a 25 per cent reduction in volume over previously available digital tape transports.

Startstop time is less than 5 milliseconds; complete remote control of start, stop, reverse, and speed change functions is provided.

Standard models have either six or eight tracks, and dual tape speeds of 60/15 or 30/15 ips.

Key Electric Corporation.

(60) Fracturing Unit Doubles Horsepower

Twice the engine horsepower provides 70 per cent more hydraulic power in the new Halliburton Twin T-10 fracturing unit.

Unit, mounted on a standard "Lo-Boy" trailer, is powered by two Cummins VT-12 600-hp diesel motors. By carrying twice the engine horsepower and by the same token, a higher percentage of the hydraulic horsepower of previous models, drillers are assured of speedier service when it is required. Increased power on one unit eliminates the need for extra equipment and additional trucks.

This new fracturing unit is designed for higher volume pumping of fracturing fluids into the well. The Twin T-10 pumps have larger plungers, reducing fluid friction loss and making possible a volume of 28 bbl per minute. Hydraulic horsepower has been increased to 880 hp per unit, over the 512 hp formerly achieved in other units. This increase makes the new unit the most powerful one in the oil industry today, the company claims.

Halliburton Oil Well Cementing Company.

(67) Spudder Goes Portable

A trailer-mounted spudder drill rig owned by the Clock Drilling Company, of Great Bend, Kansas, has been receiving considerable attention and favorable comment in the west-central Kansas oil fields.

Rig was recently mounted on a spe-

Simplify Your
Oil Exploration Surveys
with the
✓ lightweight
✓ easily carried
Porto Pump

Porto Pump is a portable pressure pump that can be applied to your advantage in Jetting Shot Holes in Geophysical Surveys and Core and Exploratory Drilling Operations. Other highly useful functions include: cleaning dirty Field Equipment and Oil Rigs, Fire Extinguishing Pump for Field Equipment and Oil Rigs, Low Volume Transfer Pump, and innumerable others.

Powered by a reliable 4-cycle gasoline engine, the Porto Pump is a rotary, positive displacement, neoprene gear pump. The complete unit weighs approximately 93 lbs. and develops pressures up to 200 psi.

Order now. Shipments made promptly.

PORTO-PUMP, INC.
19735 Ralston • Detroit 3, Mich.

Get the best by test!
Prove it yourself—use the ADVANCE for a trial period, anytime, anywhere, without obligation. Write for a free demonstration.

Advance
air powered
TUBING SPIDER
The ADVANCE is the first and only complete Automatic Air-powered Tubing Spider. It is also available for hydraulic operation. It is full of features that you'll not find in any of its imitations.

Advance
OIL TOOL CO.
2853 Cherry Ave.,
Long Beach 6, Calif.
Garfield 485-64
Mid-Continent Rep: Hillman-Kelley
Export Rep: Roland E. Smith

cially designed 25-ton capacity Triple-Axle low-bed trailer manufactured by Transport Trailers.

The Triple-Axle assembly, which is an exclusive Transport Trailers design, spreads the load evenly between 12 tires and permits travel on or off the highway. The rig sits 32 in. off the ground.

Transport Trailers, Inc.

(68) Hook Speeds Lifting Chores Offshore

A new patented lifting hook, now being used to speed up heavy lifting chores in offshore oil drilling operations, is announced by Gar-Bro Manufacturing.

This hook, pneumatically operated and electrically controlled, can be operated by pushbutton from the cab of a crane. It is made in two sizes—6- and 12-ton capacities — and is all welded and reinforced. The hook is safe and positive in action. Although its jaws open wide for easy pickup, they overlap in closing and cannot open with any load suspended.

Gar-Bro's new lifting hook is also used to handle concrete buckets on construction jobs or for handling any bundled load having a bail.

Gar-Bro Manufacturing Company.

(78) Hydraulic Steering

Latest addition to the tractor accessory line of Sherman Products is a hydraulic power steering unit for attachment to the Fordson-Major diesel tractor.

The Sherman power steering device comprises a combination hydraulic servo valve and cylinder that is actuated by the pitman arm of the tractor steering column. Hydraulic power to operate the cylinder and valve combination is supplied by a self-contained pump and reservoir unit, driven by a V-belt from the generator pulley on the tractor.

Adaptable to the Fordson-Major tractor with all combinations of industrial and agricultural attachments, the Sherman unit is said to eliminate side thrusts and shocks that normally tug at the steering wheel. Most important advantage of the unit, however, is in making steering easier when the front of the tractor is weighted down by a heavy attachment such as a Sherman front-end loader.

Simple design reduces mechanical failure of the unit and provides a rapid installation time of approximately one hour. Manual steering remains should the hydraulic system of the tractor fail for any reason.

Sherman Products, Inc.

(77) Multiple-Channel, Magnetic Recording Heads

Data Storage Devices announces a new and improved line of multiple-channel, magnetic recording and playback heads for a wide variety of uses, such as computer input-output equipment, memory drums, discs, and telemetering recording.

The audio field is also covered with heads for ¼-in. tape, 16-mm and 35-mm film.

The unique design and construction methods used in these heads is said to have resulted in the practical elimination of all of the major disadvantages previously existing in magnetic heads. Precision machining removes adjustment problems by assuring complete and simple interchangeability of heads, the elimination of any potting compound at the head surface prevents oxide build up, and the use of a laminated core consisting of strips of a special alloy .002 in. in thickness results in greater efficiency and heads that are not affected by wide temperature variations, vibration and shock.

All heads are subject to a wide variety of modifications to suit the individual needs of the customer, such as low and high impedance and bit density capacity for digital use.

The company specializes in designing heads to customer's physical and electrical characteristic requirements.

Data Storage Devices, a division of J. B. Rea Company.

(69) Oil Field Motor Features Improved Insulation System

A new Tri-Clad 55 motor in 5 through 30 hp designed specifically for oil field applications has been announced by General Electric's medium induction motor department.

The department has said the new induction motor utilizes a newly developed insulated wire, Alkaner,* making possible higher horsepower per pound and virtually eliminating burnouts.

A synthetic enamel with a permissible operating temperature of 140C, Alkanex allows up to 40 per cent more temperature rise than ordinary wire enamel.

Described as ideally suited for the outdoor use encountered in oil field applications, the new motor is smaller and lighter in comparison to the former model, according to company engineers. Each rating has been reduced one frame size. For example, the 10-hp motor is now built in a frame that formerly held a 7½-hp motor.

Specially designed screens cover all open sections of the motor to eliminate damage from animals and rocks. A weather-resistant paint deters rusting, and the stator core is treated with Dri-Film* silicone water-repellent to minimize water damage.

Other features include a cast iron enclosure with underribing to prevent the motor from being twisted out of line, an easy-access conduit box, a large eye bolt, and a bearing system that uses new-type greases.

The new Class "B" insulation system also features Mylar*** polyester film.

Company engineers claim that design improvements in the new units have produced a more fully protected motor that promises fewer breakdowns, less maintenance, and longer life.

General Electric Company.

*Registered Trade-mark of the General Electric Company.

***DuPont Registered Trade-mark.

(70) Compressor Takes Demonstration Tour

A new "package" compressor for oil and gas field use developed by Clark Bros. has just completed a tour of key cities in Kansas, Oklahoma, Louisiana, Texas, and New Mexico.

Unit has been transported on a truck during the tour, and this has enabled the Clark representatives to demonstrate the exceptional portability of the compressor. It is mounted on heavy steel skids, and is actually a completely self-contained compressor station.

Compressor is specifically designed for gas lifting and gas gathering uses. The unit, which is designated as the model CFA, consists of the new compressor, an engine, and a radiator for the compressor, in addition to all necessary accessories. Unit may be hauled to its field destination on practically any truck.

Clark engineers state that because of its balanced/opposed design, the new compressor is practically vibrationless and can be operated practically anywhere, including floating barges, trailers, etc. In tour, the unit was demonstrated on a regular oil field-type of low-boy tractor trailer.

The demonstration unit was set to be rated at 188 bhp, although other models are available at horsepower ratings of 75-200 bhp. The engine driving compressor was operating on liquefied propane gas. Field units, however, operate on natural gas.

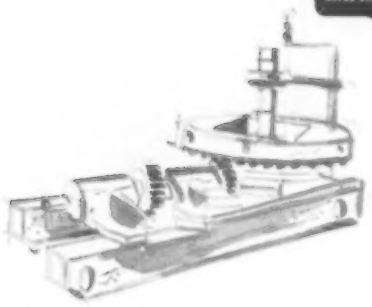
Clark Bros. Company, one of the Dresser Industries.

(25) Pneumatic Pressure-Ratio

A pneumatic pressure-ratio computer that measures compressor inlet and outlet pressures and simultaneously calculates the ratio of these

OVER 45 YEARS EXPERIENCE

BREWSTER



THIS BREWSTER ROTARY LED THE FIELD IN 1910 – A LEADERSHIP THAT HAS CONTINUED WITH EACH SUCCESSIVE MODEL FOR 46 YEARS. TODAY BREWSTER ROTARIES ARE THE FINEST EVER OFFERED.

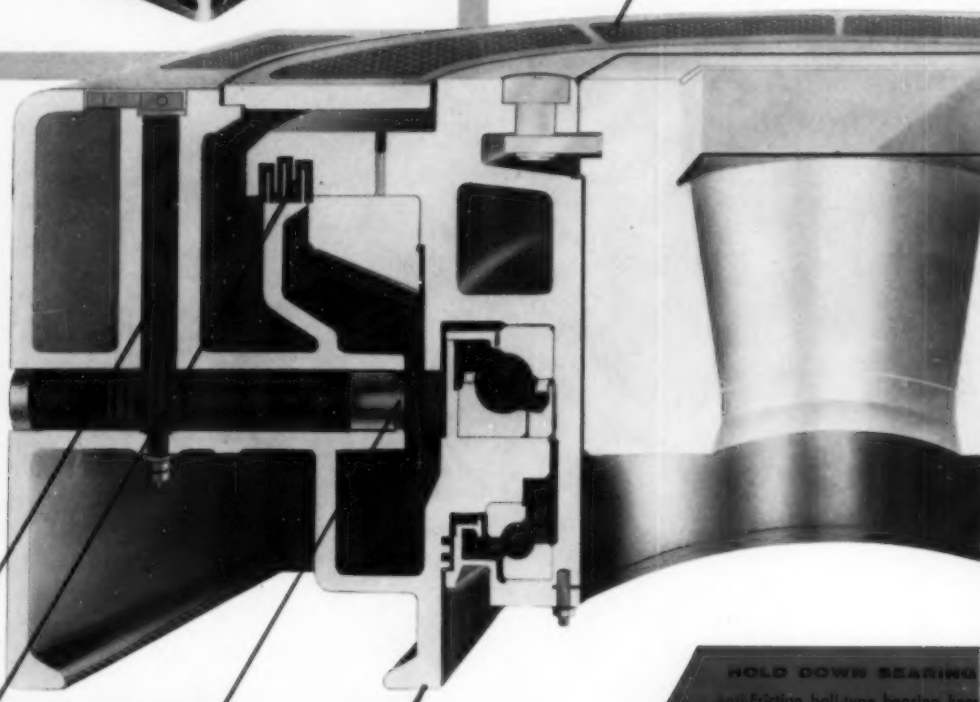
You can be sure of more hole, faster, when you run Brewster Rotaries. From top to bottom, they are built to take any drilling condition you will ever meet. These rotaries are simply and ruggedly designed; there are no complicated parts or delicate adjustments. Completely sealed against mud and foreign matter, they spend more hours on the job, have less down time and last longer than any rotaries of equal capacity. Performance records covering millions of feet of hole prove that with faster drilling speeds and lower maintenance costs, Brewster Rotary tables pay for themselves over and over.

OIL BATH ROTARIES

Now available in a complete size range from 12-inch to 27½-inch table opening, there is a Brewster Oil-Bath rotary to suit every drilling need. Ask your supply house or write to Brewster direct for complete information.

Tough Rotaries meet Tough Service...

COMPARE THESE BREWS



RSH-18
OIL BATH
ROTARY

GREASE LUBRICATION

OIL LUBRICATION

FLUSH DECK

Free of projections and di
treaded to afford safe foot
crew.

HOLD DOWN BEARING

Anti-friction ball type bearing keep
gears accurately meshed and hol
table in alignment under heavie
loads — eliminates vertical slack
the assembly. Has individual grea
lubrication.

TABLE LOCK

Easily accessible for rapid operation. Flush with table top for working safety.

MUD SEAL

Triple groove labyrinth seals gear compartment from drilling mud. Has no friction fit parts to wear out.

HEAVY STEEL SKD

Thoroughly heat treated to develop maximum physical properties. Rugged construction prevents distortion under heavy loads and maintains exact alignment of gears.

LOCK PIN

Engages skirt preventing any transfer of shock to gears, bearings or shaft.

WSTER EXTRA LIFE FEATURES

RING GEAR AND PINION

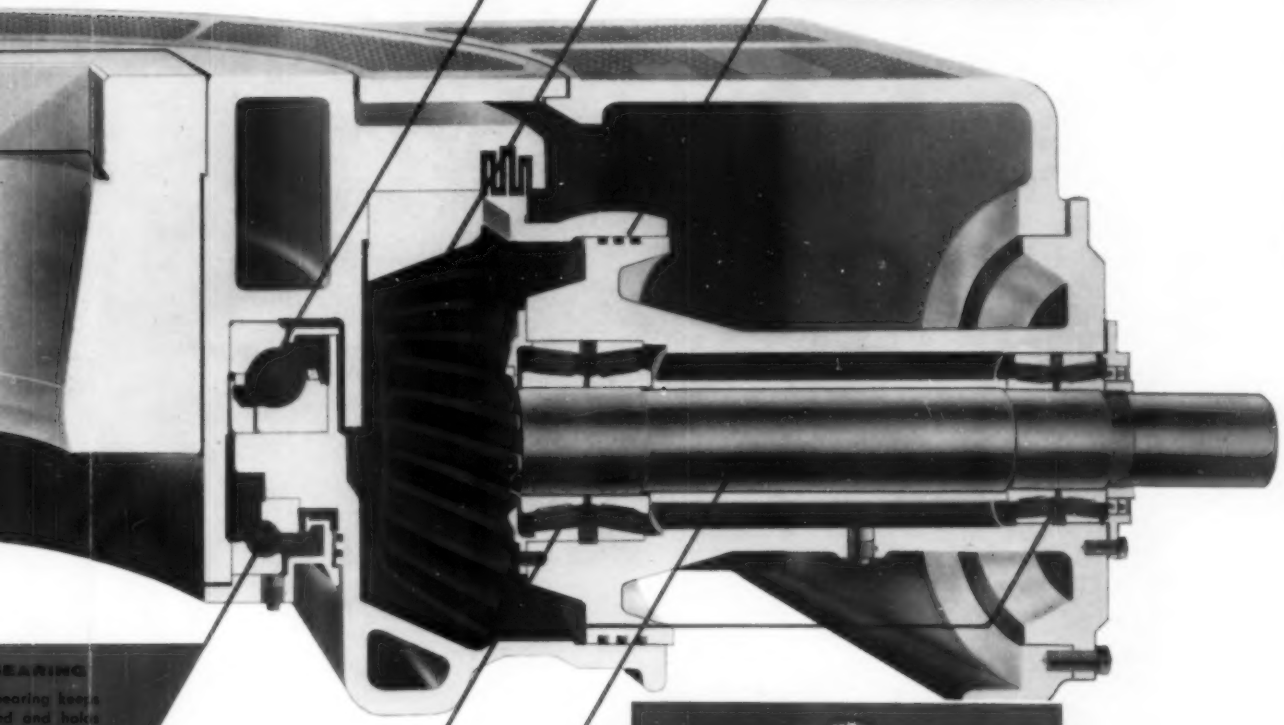
Spiral bevel gears, machined from heat-treated alloy steel. Is oil lubricated from own separate reservoir.

MAIN BEARING

Main bearing heavy duty steel balls mounted in hardened steel races. A bronze retainer ring holds balls in even spacing.

OIL SEALS

Triple "O" ring seals keep dirt and foreign matter out of gear compartment.



DECK

...ns and diamond ... safe footing for ...

...EARING

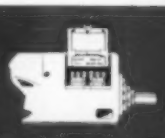
...earing keeps ...d and holds ...der, heavier ...ical slack is ...idual grease ...

...O DOUBLE-ROW ...MKEN BEARINGS

...s both thrust and radial loads. ...high in capacity, this type ...ng has great resistance to ... Lubrication is furnished by ...e fittings grouped at the lubri... port.

SHAFT

Heat-treated alloy steel, machined to close tolerance for accurate fit and smooth operation.



LUBRIPORT

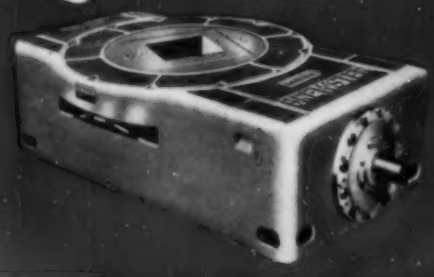
An exclusive Brewster development shields and protects all lubricating fittings and oil plugs. From this one point on a Brewster table every part may be individually lubricated. Separate oil reservoirs for main bearings and for rug gear and pinion prevents contamination of bearings from metal particles produced by gear wear. Grease lubrication of pinion and hold-down bearings provides instant lubrication regardless of how cold temperatures are when table is started up.

A size for economical drilling...

AT EVERY DEPTH

18" MODEL RSH-18
Center distances 44" and 53½"

22" MODEL RSH-22
Center distance 53½"



27½" MODEL RSH 27½
Center distance 53½"

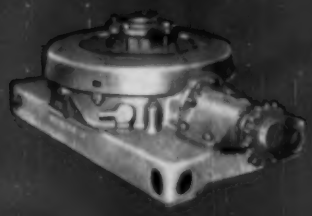
THE BREWSTER COMPANY, INC.

SUPPLY HOUSES

Howard Supply Company – Apex Equipment Company – Bovaird Supply Company – Industrial Supply Company – Murray Brooks, Inc. United Supply and Manufacturing Company – For Canada, Mexico and Export Sales: The Brewster Company

18" MODEL OS-18
Center distances 43" to 45"

12" MODEL OS-12-L
Center distances 43" to 45"



12" MODEL OS-12-S
Center distances 26½" to 30"

two pressures is now available from Hagan.

Outstanding features of the Hagan Model PR-O Computer are wide range, flexibility, accuracy, and pneumatic signal transmission.

Pressure-ratio is a key variable that must be regulated in order to prevent flow instability or surge in exhauster, compressor, or blower control systems. The instrument indicates pressure-ratio on an integral scale and generates a pneumatic signal proportional to pressure-ratio for use in a control system.

Model PR-O can be used in any other application that requires the calculation of the ratio of two pressures.

Computer is available for application in ranges of static pressures of from 0 to 10 psia up to 0 to 400 psig. Higher static pressure ranges are available. Available for computing on a gage or absolute pressure basis, Model PR-O can also be supplied with either a zero base or suppressed scale indication.

Ratio calculating accuracy of the computer is high even when the input static pressure turndown ranges are as great as 30 to 1. The computer's pneumatic output signal can be used for control within the normal distance of pneumatic transmission, since the pneumatic output is proportional to the ratio. Remote recording or indication of the ratio can supplement the local mechanical indication within the computer.

Additional computer models are available for wide range square root extraction, squaring and multiplying operations.

Hagan Corporation.

(275) Explosive Valve

Announcement has been made of the new, exclusive, standard model Conax Explosive Valve by the explosive products division of Conax.

This normally closed, small, lightweight Conax Explosive Valve standard model is a dead tight, shut-off valve for long or short-time storage of gas or liquid under high pressure and operates instantaneously by firing a small, completely contained explosive squib.

The standard model flow passages, which are closed off by a solid, integral diaphragm inside the valve body, is available with five different sets of inlet and outlet port arrangements. Four standard center-to-center mounting holes in the corners of the valve body permit stacking of two or three of these valves. Stacking these standard Conax Explosive Valves provide increased flow rate, decreased pressure drop, and pushes reliability up to infinity.

Upon firing, an unobstructed flow passage is opened in .002 sec from inlet to outlet ports with an equivalent orifice of 9/32 in. diameter, by the ram moving forward shearing and trapping the diaphragm as a single piece of metal. Only ½ amp electrical current is required to fire the explosive squib. This new standard model has a maximum operating pressure of 5000 psi and proof pressure of 10,000 psi. In addition, this Conax Explosive Valve model is sealed against back pressure up to 4500 psi on the downstream side permitting proof testing of system, if required, before firing.

Products of combustion are completely sealed in the explosive chamber eliminating any possible contamination of the system. This confinement reduces the noise level of firing to zero. Sensitivity to physical shock is nil.

Standard model Conax Explosive Valve is made of aluminum body with stainless steel trigger, weighs only 6 oz complete. The all-stainless steel valve weighs only 10 oz. Three-inch pigtails are provided as standard for electrical connections. AN plug or terminal ends are also available.

Conax Corporation.

(245) Speed and Maneuverability Are Features of Lift Truck

The many operating advantages of the Hyster Monomast Lift Truck are now available for the first time on a pneumatic-tired truck, the Hyster QN-20 of 2000 lb capacity at 24-in. load centers.

Announcement of this new model follows the 1955 introduction of the solid-cushion-tired Hyster UC-30 and YC-40 Monomast Lift Trucks.

This compact new Hyster QN-20 Monomast Lift Truck is claimed to be an ideal "work horse" for both inside and outside production. Specific operating advantages include faster load placement, reduced driver fatigue, and greater safety. Rigidity and stability factors of the Hyster Monomast upright assembly are reported to be unexcelled.

Compactness and maneuverability permit the Hyster QN-20 Monomast Lift Truck to work rapidly in narrow aisles and crowded areas. The lift truck is powered by a heavy-duty, air-cooled Wisconsin gasoline engine and is equipped with pneumatic tires for dependable performance on all surface conditions.

The complete line of Hyster hydraulic attachments can be readily mounted on the attachment carriage. Hyster LP-Gas conversion kits are also available.

Hyster Company.

(240) Valve for Pneumatic Control Systems

Industrial products division of Westinghouse Air Brake has announced development of a ¼-in. "D" Pilotair Valve for use as directional valves, interlocking valves, transfer valves, sequence valves or shutoff valves in pneumatic control systems with pressures as high as 250 psi and temperatures as high as 200F.

The ¼-in. valve supplements the company's line of ½-in. "D" Pilotair Valves, which was introduced about a year ago.

This new, smaller valve has the advantage of being able to be used in a system where not as much air is needed and where the amount of space that can accommodate a valve is a factor. The ¼-in. valve can also be used as a remote control for a system using larger quantities of air. Valve also has the advantage of being less expensive because it is smaller.

A unique feature of the "D" Pilotair Valve is its sectionalized construction, which permits over 3000 different two, three and four-way valves to be assembled from a few basic parts. Three and four-way valves are built with open exhaust and with tapped exhaust ports. They may be operated manually, pneumatically, mechanically, or electrically. When desired, two operators (not necessarily of the same type) can be assembled on the same valve. For example, a pneumatic operator can be placed on one end of a valve and an electrical operator on its other end. This sectionalized construction also permits each port, each end section, and each operator of each one of the 3000 possible valves to be rotated in 90 deg steps through 360 deg.

The sectionalized construction of "D" Pilotair Valves results in a great economy. Valves have the advantage of being especially designed while retaining the low cost of large production.

Westinghouse Air Brake Company.

(295) Introduces New Connector Line

A new series of waterproof, shock-resistant- electrical connectors with five assembly styles has been introduced by the Scintilla Division of Bendix Aviation.

The series, designated QWL, is being used with multi-conductor cable on ground-launching equipment for missiles and ground radar units, and on heavy construction and oil field equipment. A complete line of accessories, including cable assembly with Kellems grip, and protection cap rings, provides adaptability of the series to any heavy-duty applications.

Various assembly styles provide either pin or socket contacts in receptacle or plug. Provisions also have been made for alternate positions, thermocouple contacts, and co-axial circuit contacts. Among the assembly styles are: wall-mounting receptacle (QWL-3100); cable-connecting receptacle (QWL3101); box-mounting receptacle (QWL3102); straight plug (QWL-3106); a flange-mounting plug (FLM-TPLUG); and two types of jam nut receptacles.

Three styles of cable accessory clamps are available to accommodate various cable sizes. A straight style is designed for a cable with diameter near the size of the connector; step-down style is for conduit that is smaller than the diameter of the connector; and step-up style is for a large cable with smaller connectors.

Waterproofing and cable strain relief are accomplished through an improved cable accessory assembly, combined with neoprene sealing gaskets, and the Kellems strain-relief grip.

Series also features the use of machined bar-stock aluminum resistant to corrosion and abrasion, and Scintilla-developed, modified, double stub thread for quick connecting or disconnecting. In addition, the specially tapered cross-section design will resist vibration. This was proved by laboratory tests with loading as high as 50 g's.

A left-hand thread also is used on the cable accessory to prevent loosening. It helps to solve the problem of earlier designs that permitted ripping conductors from contacts by inexperienced personnel.

The connector showed no evidence of thread wear after being subjected to 2500 coupling and uncoupling cycles. In additional tests, there was no evidence of corrosion after the connector had been salt-sprayed for 5000 hr.

Scintilla Division, Bendix Aviation Corporation.

(22) New Safety Belt

A new automotive seat belt, known as "Saf-Driv" and designed to meet the rigid requirements of industrial fleet owners, has been introduced by Ansul Chemical.

Ansul has developed a unique method of anchoring the belt to the vehicle's frame. The belt's harness assembly provides metal to metal contact for all movement. There is no danger of metal fittings weakening and wearing the belt webbing.

Installation is easy—only three holes must be drilled in the frame for two belts. This assures easy change and replacement, too, for industrial fleet operators or owners who trade in cars frequently.

The belt assembly is approved by the Civil Aeronautics Administration, which has developed its specifications through years of experience with airplane safety belts. The Saf-Driv belt meets aviation safety standards according to strength, age, mechanical and deterioration effect, and fire precaution. Its material strength is greater than the 2250-lb C.A.A. requirement.

In the belt assembly, the one-way threading buckle can be tightened easily, but will not loosen under pressure. The satin-finished aluminum latch provides the only means for unbuckling the belt. The buckle itself consists of a heat-treated steel base that is chromium-plated and satin-finished.

Belt webbing is two inches wide, woven from specially treated high-quality rayon-nylon. Mildew-proofed and flame-resistant, the webbing has a special weave designed for use with the Saf-Driv buckle.

Saf-Driv automotive seat belts come in three standard models. In addition, Ansul specializes in custom installations for trucks, busses, emergency vehicles, and sports cars. A special back seat installation is also available.

Ansul Chemical Company.

(44) Makers Provide Immediate Identification Of Piping

New item for immediate identification of indoor and outdoor piping is now on the market. It provides a permanent legend on existing pipe installations and is easy to install.

Item is a permanently shaped, wrap-around, snap-on, Vinylite plastic Pype Identification Marker. The marker is color-coded to conform to the American Standard of pipe identification and comes in one or two-word descriptions indicating the material, gas, or air being transported in pipe.

The legend is printed on light, fast-colored paper, which is completely enclosed in plastic that is laminated between two sheets of Vinylite and formed to completely encircle the pipe. The overlapping edges are cemented to each other and form a cylinder around the pipe so that the marker will not fall off or be put back on the wrong pipe line.

For hazardous or dangerous materials, a yellow background with black printing is suggested. Fire protection on red; safe materials on green backgrounds, and so on. Various colored printing can also be used on the colored backgrounds.

Installation is suggested as follows: One marker for every 20 ft of pipe line; one marker where a change of direction takes place, or where a pipe line leaves or enters a building or room; one marker at every major valve, at entrance to manifolding and at least 6 ft from exit or entrance to a vessel or tank; one marker, over insulation, on lines that are above 165F. Identification should be enough to give positive identification of lines and equipment at a glance.

Wilmington Plastics Company.

(272) New Self-Priming Valve Lubricant Gun

A new, compact, lightweight air-operated lubricating gun designed to meet field and plant maintenance needs has been introduced by Rockwell.

Described as the only positive, self-priming plug valve lubricant gun on the market today, the new "Hypregun" weighs only 39 lb and operates on air pressures up to 150 psi. It is recommended especially for large-scale valve lubricating in refineries, compressor stations, gasoline plants, cycling plants, pipe lines and Christmas tree installations.

A specially designed air motor and double-piston construction provide the self-priming action, an outstanding feature of the new gun.

The "Hypregun" uses Rockwell-Nordstrom five-quart lubricant cans that are loaded directly into the gun, eliminating all manual handling of lubricant or changing lubricant from one container to another.

Rockwell Manufacturing Company.

(128) Fenders for Offshore Tenders

Pictured is a recent special fabrication in rubber fenders for use on offshore drilling tenders.

The set is composed of two 14-ft rubber cylinders of approximately 12-in. OD set about 18 in. apart and

The Petroleum Industry's Oldest Engineering Publication

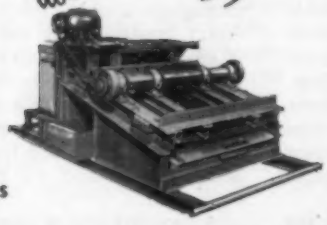
That is The Petroleum Engineer, read and relied upon by operating men throughout the U. S. and sixty-seven foreign countries for twenty-five years... the same publication which has recently undergone changes in line with twenty-five years of industry progress... the most practical and progressive re-modeling job conceivable, to fill the needs of operating men engaged in each division of the industry.

Scan carefully the copy in your hands, noting the calibre and "personal assistance" value of its contents. It brings you monthly coverage of operations, news, personals and pictorials nearest your interest, in addition to world petroleum developments and news... to *provide you a publication of 100% practical value.*

USE THE ENCLOSED CARD
to Start Your Personal Copy Today

The Petroleum Engineer
P. O. Box 1589 **Dallas 1, Texas**

HUTCHISON MANUFACTURING CO.
6609 AVENUE U, HOUSTON 11, TEXAS



ALSO REMOVES SHALE

ALWAYS IN OPERATION WHEN PUMPS ARE RUNNING

EVERY WELLDIGGER SHOULD HAVE THIS FREE BOOKLET

This new Martin-Decker booklet contains a wealth of information about drilling-control instruments vital to every driller, toolpusher, engineer, oil operator, and contractor. This is not a mere catalog of gauges for sale, but a genuinely instructive handbook that, with photographs, schematics, and non-technical language, explains the workings of instruments and the parts they play.

Write for Bulletin P-61, Martin-Decker Corporation, 3431 Cherry Ave., Long Beach 7, Calif.

MARTIN-DECKER CORP.
HOME OF THE WEIGHT INDICATOR — LONG BEACH, CALIFORNIA

bound to two heavy-duty rubber tire casings, by means of heavy steel chain interlaced through casings and rubber post.

This type of fender has been found to be excellent on workboats, tugboats, barges, etc., to prevent much of the usual damage. These fenders can be made in sets and sizes to suit requirements.

Joe Stine, Inc.

(159) Friction Brake Added

Availability of a friction-type swing brake on all shovel-crane has been announced by Link-Belt.

The complete Link-Belt Speeder line of crawler and rubber-tired shovel-cranes, in 12½ to 35-ton lifting capacities, now has available the hydraulic-control swing brake feature.

Particularly valuable for lifting crane operations calling for precision spotting of loads, the hydraulic control swing brake allows an operator to hold the boom of all Link-Belt Speeder shovel-cranes in any desired position by easy finger-tip control. On long boom operations, where a few inches of swing at the boom foot results in several feet of swing at the boom peak, the advantages of a friction-type swing brake are readily apparent.

Braking effort is hydraulically applied through "Speed-o-Matic" power hydraulic controls and spring released.

A unique feature is the application of the patented Link-Belt Speeder "Speed-o-Trol," the friction throttle-type control that actuates a Link-Belt Speeder variable pressure hydraulic valve. The combination allows the operator to provide any amount of drag required to reduce drifting of the boom in high winds or on an incline, or to set the brake fully and still have both hands and feet free to operate other levers.

Link-Belt Speeder Corporation.

(87) Device Helps Solve Sight Glass Problems

A special patented lens and mounting, described by the maker as the solution to sight glass problems in pressure vessels, has been developed by PresSure Products.

Device is equipped with "Safelite" lens, consisting of two pressure discs and one shielding disc positioned in a flanged body, with non-extrudable top-and-bottom cushion gaskets. This in turn is surrounded by special packing that is said to eliminate undue stress on the glass itself and the risks taken when the flange bolts are tightened.

"PresSure," the trade name given the product, can be shielded for acids, including hydrochloric acids, caustics, chemicals, and other fluids; vapor attack, and nuclear radiation. A suitable colored glass will shield it from intense light rays.

According to the maker's announcement, "PresSure" is ideal for the chemical, food processing, pharmaceutical, petroleum and many other industries, including their research departments. The extremely rugged sightglass mounting and sealing arrangement will provide industry with an instrument capable of a much wider pressure range of applications than heretofore possible.

"PresSure" can be specified as standard on new equipment, or can be very easily adapted to equipment now in use, thus permitting increased pressures and temperatures (up to 400 deg) in vessels now in use.

PresSure Products Company.

(80) Mud Gun Features Ball Swivel

Byron Jackson announces a new PB heavy-duty Mudjet Mud Gun that combines free-swiveling with positive setting.

Described as the only mud gun to feature a ball swivel designed specifically for mud gun use, Mudjet swivels freely on both the horizontal and vertical planes. Free swiveling is provided by high-strength balls rolling in heat-treated alloy steel races.

Another exclusive PB feature — the Cam-Lok — emphasizes quick positive setting of the gun in any desired swivel position. This new locking mechanism is easily set and released by hand — no tools are required. One Cam-Lok controls vertical rotation and the other controls lateral setting. The Mudjet gun may be left unattended or may be adjusted while in operation.

Byron Jackson Tools, Inc.

(88) Translucent Tarpaulin Fabric Offers Wide Uses

A new fabric for tarpaulins and similar protective coverings combines translucency with high strength, low weight, weather resistance and other advantages.

This material, being introduced by Herculite Protective Fabrics, is made of loose-mesh weave Fortisan-36 (Celanese high-strength rayon) laminated between two outer vinyl coatings.

Besides offering considerably greater strength and dimensional stability than natural fibers, Fortisan-36 is resistant to the sunlight degradation that attacks certain other fibers.

Among initial uses foreseen for the vinyl-laminated Fortisan-36 fabrics are linesmen's tents, hatch covers, portable repair shelters, and numerous other coverings that permit light transmission while providing weather protection for various production, repair, and maintenance operations.

Herculite Protective Fabrics, Inc.

(79) Power Saw Improves Mechanism

Saw-Mor, the reciprocating saw attachment for electric, air drills, and flexible shafts, has recently been improved in mechanical design.

A completely new blade-holder replaces the previous holder, and is said to securely grip the saw-blade, holding it firmly in position against the chuck-plate with two cone-tipped set screws. Removal of the blade is expedited by a simple turn of standard Allen Socket Set Screws.

In addition to the new blade holder, the entire wobble-shaft mechanism has been redesigned with improved balance, insuring a full ⅞-in. stroke with vibration reduced to a minimum. The wobble-shaft is the mechanism that converts the rotary action of the drill to a reciprocating motion.

Entire weight of the new Saw-Mor is only 3½ lb, permitting easy portability. It may be used at the work-bench or carried up ladders, and reaches into hard-to-get-at places. The newly redesigned saw is said to speed up sawing of all metals, stainless or monel, as well as wood, plastics, cable, composition, etc.

Saw is especially recommended for metal-working industries, body and fender work, electrical and building contractors, maintenance men, wrecking crews, etc. One of the many uses of the Saw-Mor stressed by the manufacturer is the safety factor it provides for cutting operations in the petroleum industry, powder plants, and other areas where flame-cutting tools create a definite fire hazard. Crash trucks at airports have also found the Saw-Mor invaluable for quick rescue of trapped persons without added hazard of fire and burns caused by flame-cutting equipment.

A complete line of Saw-Mor blades with special teeth arrangements is available for cutting every type of material.

Saw-Mor Tool & Blade Company.

If you're not in the book *you're a man without*

. . . . . a country
. . . . . a state
. . . . . a county
. . . . . a town
. . . . . a party
. . . . . a street
. . . . . a school
. . . . . a *vote*

Look at all the things you can lose, if you're not a registered voter.

If you're not in the book, you lock yourself out of the elections. The polls are closed to you. You can't vote on streets, or schools, councilman or mayor (not to mention congressman, senator or president). You don't even have the right to *complain* about your government and the way things are run!

But more than that, you cut yourself apart from your neighbor next door, your friends at the shop, your fellow members in union or club.

You lose the right to look that boy of yours in the eye when he wants to know if you're doing your part.

And you lose the self-respect that comes from knowing you can walk into the polls on Election Day—the one place in the world where all free men are really equal. Isn't it too much to risk for the little time that registering takes?

Get your name in the book
—and do it now!

Is your name in the book?

Horsepower for Horsepower...

ALCO

Standard-Package

DIESEL-ELECTRIC DRILLING PLANT

drills deeper, faster, more economically
than any other type of power or transmission

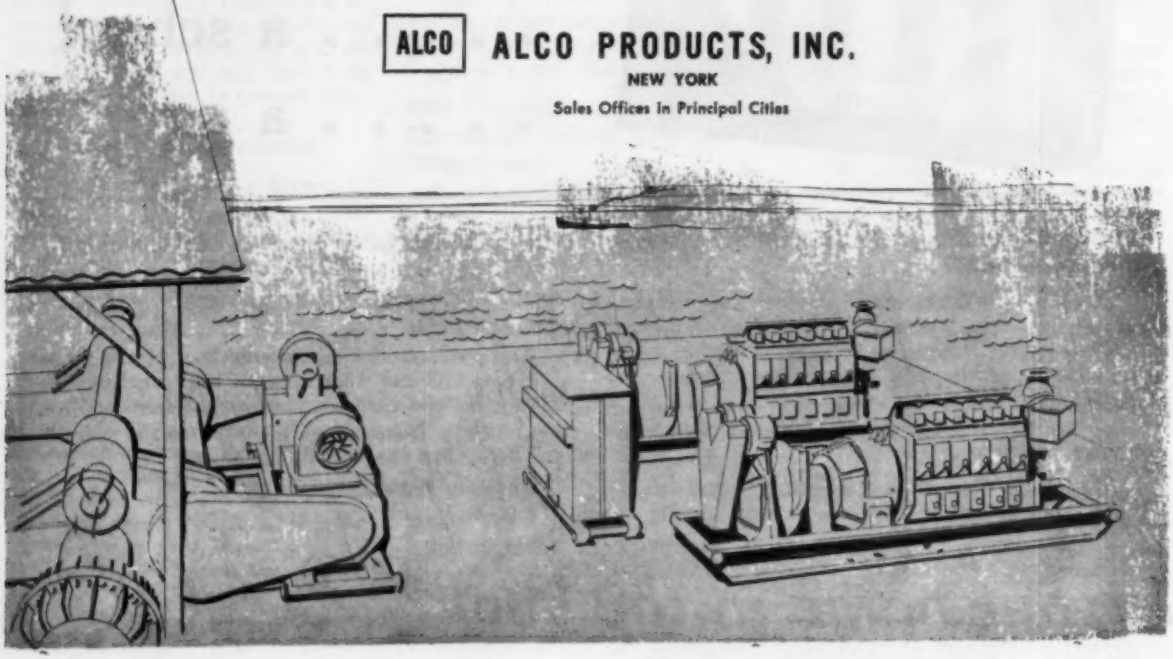
Completely self-contained, the ALCO diesel-electric drilling power package provides 100 per cent standby. No other power is required.

The basic ALCO unit provides 1370 hp for drawworks drive and 600 hp for two mud-pump drives, plus power for lighting and other auxiliaries. A wide variety of standard modifications allow for larger mud-pumps, rotary, mud-mix or coring-reel drives.

Flexibility and simplicity are prime reasons for the diesel-electric plant's economy. The driller has finger-tip control of smooth electric power for all operations, under any drilling condition. And the skid-mounted components can be moved readily from site to site.

This ALCO diesel-electric drilling power package is available at a cost comparable with that of an ordinary power rig. Contact your nearest ALCO representative or write P. O. Box 1065, Schenectady 1, N. Y., for a detailed brochure.

ALCO ALCO PRODUCTS, INC.
NEW YORK
Sales Offices in Principal Cities



It takes specialists with experience to design and build quality into

LEE C. MOORE

masts

LEE C.

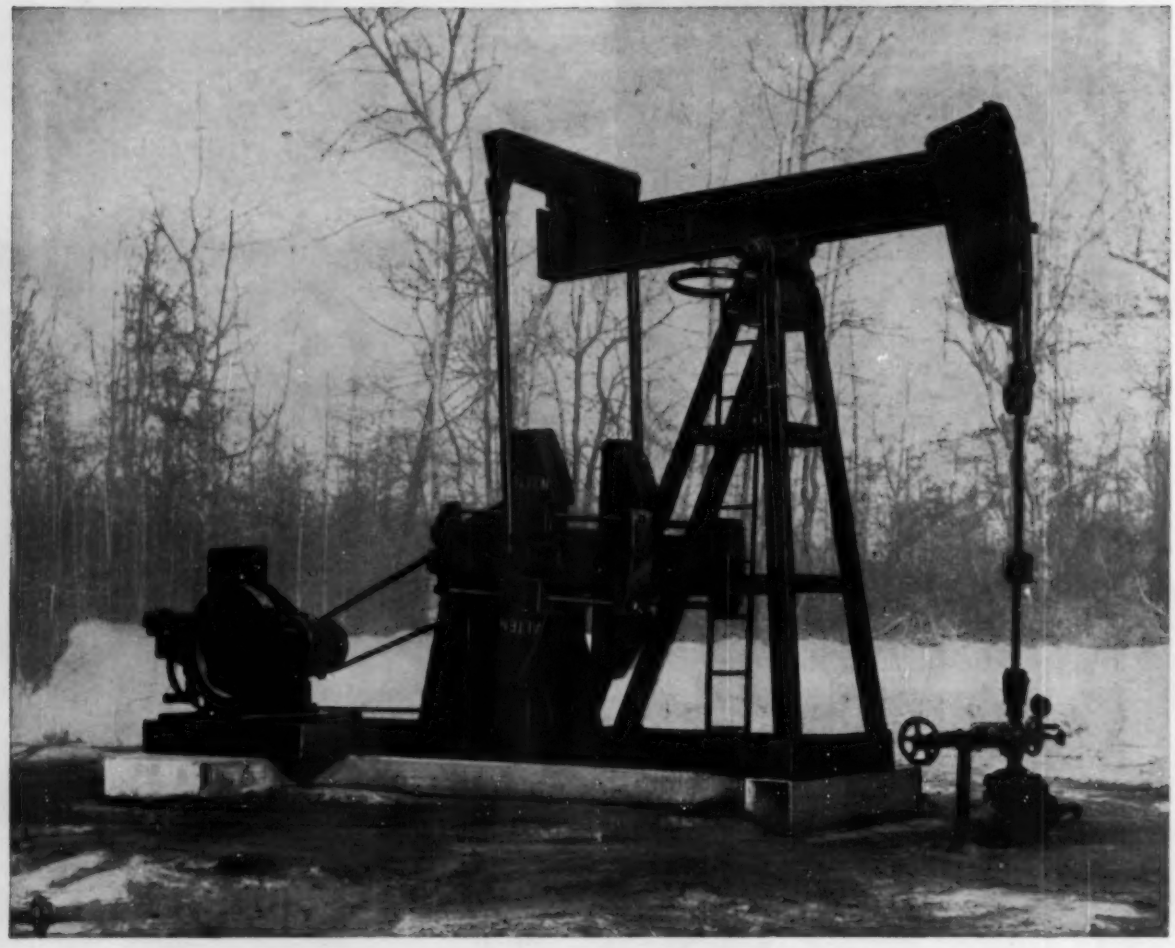
Moore

CORPORATION

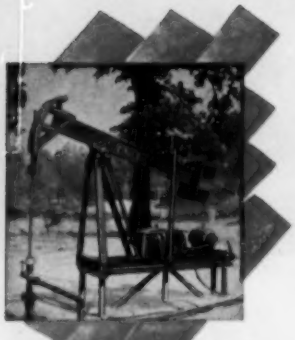
TULSA : SHREVEPORT : GREAT BEND : CASPER : NEW ORLEANS CENTRALIA : DALLAS : HOUSTON : MIDLAND : PITTSBURGH

EXPORT OFFICE:—ROOM 624, INTERNATIONAL BLDG., 630 5TH AVE., NEW YORK 20, NEW YORK

FOREIGN LICENSED MFR.: OIL WELL ENGINEERING CO., LTD., CHEADLE HEATH, STOCKPORT, ENGLAND



Pumping their way to Leadership



ALTEN PUMPING UNITS

Thousands of ALTEN Units—operating for years with low, low cost records —*Are Pumping Their Way to Leadership*. Put them to work for you!

Available in all sizes: small beam balanced, beam and crank balanced, or medium and large types with the ALTEN screw-type adjustable counter balance. You can be sure of peak performance with every model in each series.

Ask your independent supply store or write ALTEN for latest catalogue and engineering information.

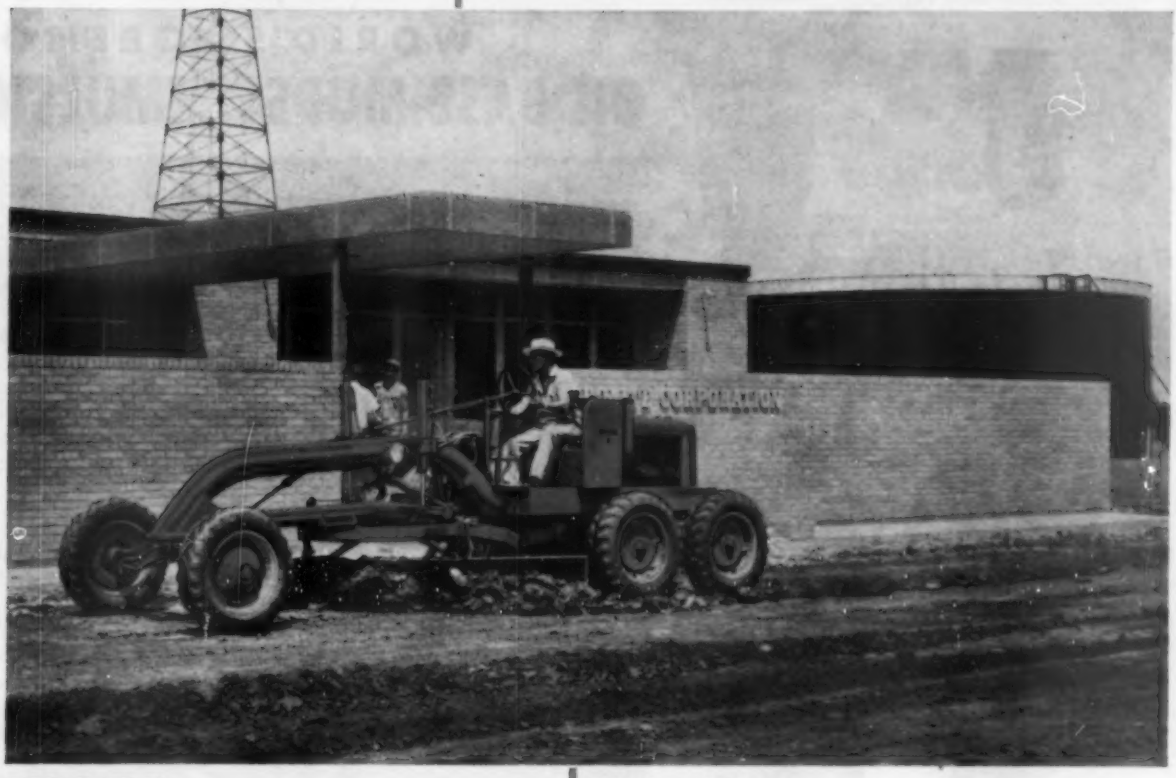
✓ **A FULL LINE OF 47 MODELS AND TYPES**

✓ **WORLDWIDE DISTRIBUTION THROUGH SUPPLY STORES**

-ALTEN-
Foundry & Machine Works, Inc.
LANCASTER, OHIO

Allis-Chalmers model D

THE LOW-COST MOTOR GRADER THAT OFFERS OIL FIELD USERS more of everything...



more PRODUCTION-BOOSTING FEATURES

Choice of Allis-Chalmers engines

GASOLINE — 50 brake hp. Bare grader weight —8,800 lb. Four forward speeds to 25.6 mph, one reverse to 3.3 mph.

DIESEL — 50 brake hp. Bare grader weight — 9,350 lb. Four forward speeds to 25.2 mph, one reverse to 3.2 mph.

ROLL-AWAY moldboard rolls the load instead of pushing it, moves more dirt, uses less power.

Plus one-piece tubular frame, tandem drive, real operator comfort, hydraulic blade lift.

USEFUL OPTIONAL FEATURES

Power circle turn for faster, easier, better control of blade . . . turns 135 degrees.

Leaning front wheels with heavy-duty axle, for better control in close quarter-work.

Hydraulically shiftable moldboard to speed work around obstructions. Shifts 16 in. each way.

Special large tires for added traction, long wear. Front (7.50-20 or 8.25-20) and rear (8.25-20).

more JOB-MULTIPLYING ATTACHMENTS

Hydraulic scarifier, mounted amidships for maximum effective ground pressure.

Shoulder maintainer for safe, one-pass operation. Also available: one-pass windrow eliminator.

Rear-mounted 5/8-yd loader for fast, low-cost handling of materials.

plus snowplows, completely enclosed standup cab, hydraulically operated mower.

more SATISFIED USERS

Since its introduction in 1949, thousands of satisfied owners have *proved* the usefulness and low-cost versatility of the Model D on all kinds of construction and maintenance.

Call your Allis-Chalmers Construction Machinery Dealer for a demonstration today!

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION
MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS

ROLL-AWAY is an Allis-Chalmers trademark.

no job too tough for **OIL**

WORLD'S FOREMOST
OIL BASE MUDS...EMULSION

"NO-GLO" OIL—For Making Non-Fluorescing Emulsion Drilling Fluids. Developed and Patented by OBI

WHITE MAGIC—Stable, non-fluorescing emulsifier and thinner for clay water muds and oil-in-water emulsions

EMULSOMAGIC
Water-in-Oil Emulsion Mud

WELL PACK—First Commercial Product for Protecting Casing Against Exterior Corrosion or Subsidence Damage

"NO-GLO" THREAD LUBRICANT—First Non-Fluorescing Pipe Dope. For Use with No-Glo Emulsion or Clay Water Muds

OB HEVYWATE—Finely Ground Barite with High Specific Gravity

ADDITIVE "E"—Stabilizer for Water-in-oil Emulsions

OB MUD GUNS—Top and Bottom Types. Commercial Design Originated by OBI

EXPERIENCE... Since Oil Base, Inc. pioneered an entirely new conception of drilling—using oil base muds—with a staff of 2 men plus a new, but basically sound idea, its personnel has built up an accumulated total of over 500 years of experience in research, development and application of OBI Products. Supporting this specialized experience is 15 years of continuous OBI service to the Petroleum Industry. This healthy growth is ample evidence of the ever-expanding demand for OBI Products, resulting from their unsurpassed performance in the field. This unmatched wealth of experience is freely available to the Industry as it continues to strive to make drilling jobs easier and wells more productive.

REPUTATION...The high reputation enjoyed by OBI Products for economy, efficiency and dependability was earned the hard way. Starting with BLACK MAGIC, continued research and development have resulted in many new OBI Products which, because they were totally unlike conventional products and produced superior results as a consequence, had to prove themselves in the field to gain the widespread confidence and acceptance they now enjoy. An indomitable pioneering spirit and a refusal to accept old materials and methods in the face of new and better ones has led OBI Research to the development of a full line of OBI Products using new materials with new characteristics to solve new problems and conditions

OBI PRODUCTS

OBI FILTER PRESS—First Press Designed for Greater Accuracy in a fraction of the time

OIL BASE HANDCLEANER—One of the finest hand cleaners ever made and designed for use without water

BASE, INC.

PRODUCERS OF....
MUDS...RELATED PRODUCTS

constantly being encountered. In consequence, OIL BASE, INC., has gained an enviable reputation for *progress* as well as *performance*.

VERSATILITY...The same pioneering spirit that led to the development and perfection of BLACK MAGIC and started the trend toward oil base drilling muds is back of the development of other equally effective OBI Products that contribute to improvements in control of weight, viscosity, emulsification, gel strength, lost circulation and many other problems pertaining to making drilling easier and wells more productive. Continuous research, followed by field tests, is constantly producing new products to meet today's conditions and helping to improve still further those products which have already set new standards for the Industry. Their success in bringing back to life many wells that were dead on arrival is well known by drillers all over the world.

WORLD-WIDE DISTRIBUTION...OBI Products are available throughout the free world, through export offices maintained at strategic points. Manufacturing plants, warehouses and sales offices are located in most major producing sections of the United States. There's a trained, experienced OBI field man within easy reach of any rig. Complete data on all OBI Products can be secured merely by phoning or writing your nearest OBI office, plant or warehouse.

Export Offices:

LIMA, PERU:
Servicios Petroleros, S.A., Apartado 1079

PARIS, FRANCE:
C. E. Pariet, 23 Rue De Prony, Paris 17

MEXICO, D.F.:
E. L. Towle, Apartado 7566

CARACAS, VENEZUELA:
Baritina de Venezuela, S.A., Apartado del Este 5180

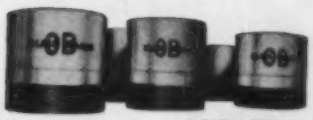
BOGOTA, COLOMBIA:
A-Z Export, S.A., Calle 10, Numero 7-30

CALGARY, CANADA:
Pacific Western Mud Service, Ltd., 631 Eighth Avenue West

CABLE ADDRESS: OBI

OIL BASE, INC.

Plants in: Houston • Odessa • Duncan
Bakersfield • Compton
Branches in: Houston • Odessa • Corpus Christi
Oklahoma City • Duncan • Lafayette • Harvey
Bakersfield • Long Beach • Ventura



BLACK MAGIC—The Oil Base Drilling Fluid. Liquid or Sacked form

BLACK MAGIC "SUPERMIX"—First High Weight, Low Viscosity Oil Base Drilling Fluid Stable at High Temperatures

PEPTOMAGIC—All Purpose Oil Base Drilling Fluid

ECONOMAGIC—Low Weight Oil Base Drilling Fluid

FORMASEAL—First Oil Soluble Material for Recovering Lost Circulation in Pay Zones. Also for Reducing Filtrate Loss of Oils

OB LOST CIRCULATION FLUID—Gels on Contact With Water

CHEMICAL "W"—Highly Viscous Liquid for Many Purposes Relating to Oil Base Fluids

OB GEL—Increases Viscosity and Gel Strength of Black Magic

CHEMICAL "X"—For Reducing Viscosity and Gel Strength of Black Magic

CHEMICAL "Y"—To Regenerate Crude Oil Contaminated Black Magic and Increases Acid Number of Mixing Oil

OB GEN—First Practical Method for Removing Water from Oil Base Drilling Fluids

OB WELL WASH—Cuts Paraffins, Removes Obstructions of Pay Zone

OB ZERO—For Increasing Viscosity and Gel Strength of Black Magic

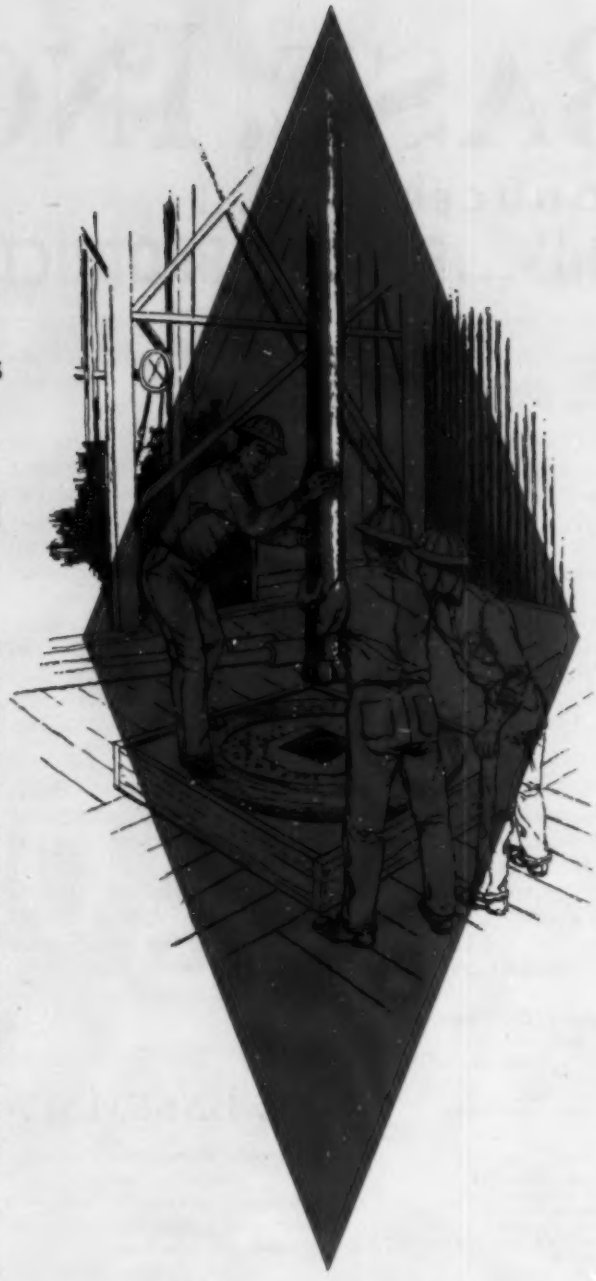
OB MIX FIX—Lowers Aniline Point of Mixing Oils for Black Magic. Also an oil base mud viscosity reducer.

OB WATE—First High Grade Limestone Weight Material

BLACK MAGIC PERFORATING FLUID For More Effective Perforating Results

SPECIAL ADDITIVE 58—Increases Acid Number of Mixing Oils for Black Magic and a Weight Stabilizer for oil base muds

D & S diamonds drill deeper, faster!



The world's ever spiralling need for oil and gas is causing deeper and deeper drilling. What's more, there are more than twice as many wells being drilled today as there were twenty years ago.

D&S Truco diamond drilling bits are making tremendous contributions in deeper drilling because of their faster penetration and efficient operation in hard strata . . . resulting in extraordinary savings in time and dollars.

WRITE OR CALL TODAY! D&S engineer-salesmen will analyse equipment, formation, depth, and operating techniques . . . and explain our custom-service and equipment. Real D&S advantages for you!

TRUCO DIAMOND BITS

Drilling & Service INC. | DIAMOND DRILLING EQUIPMENT

6210 NORTH CENTRAL EXPRESSWAY | DALLAS, TEXAS

OFFICES IN ALL PRINCIPAL OIL AREAS

Ultra Fine Diamond Equipment for the Oilfield

DIAMOND CORING BITS Fast penetration, full core recovery.

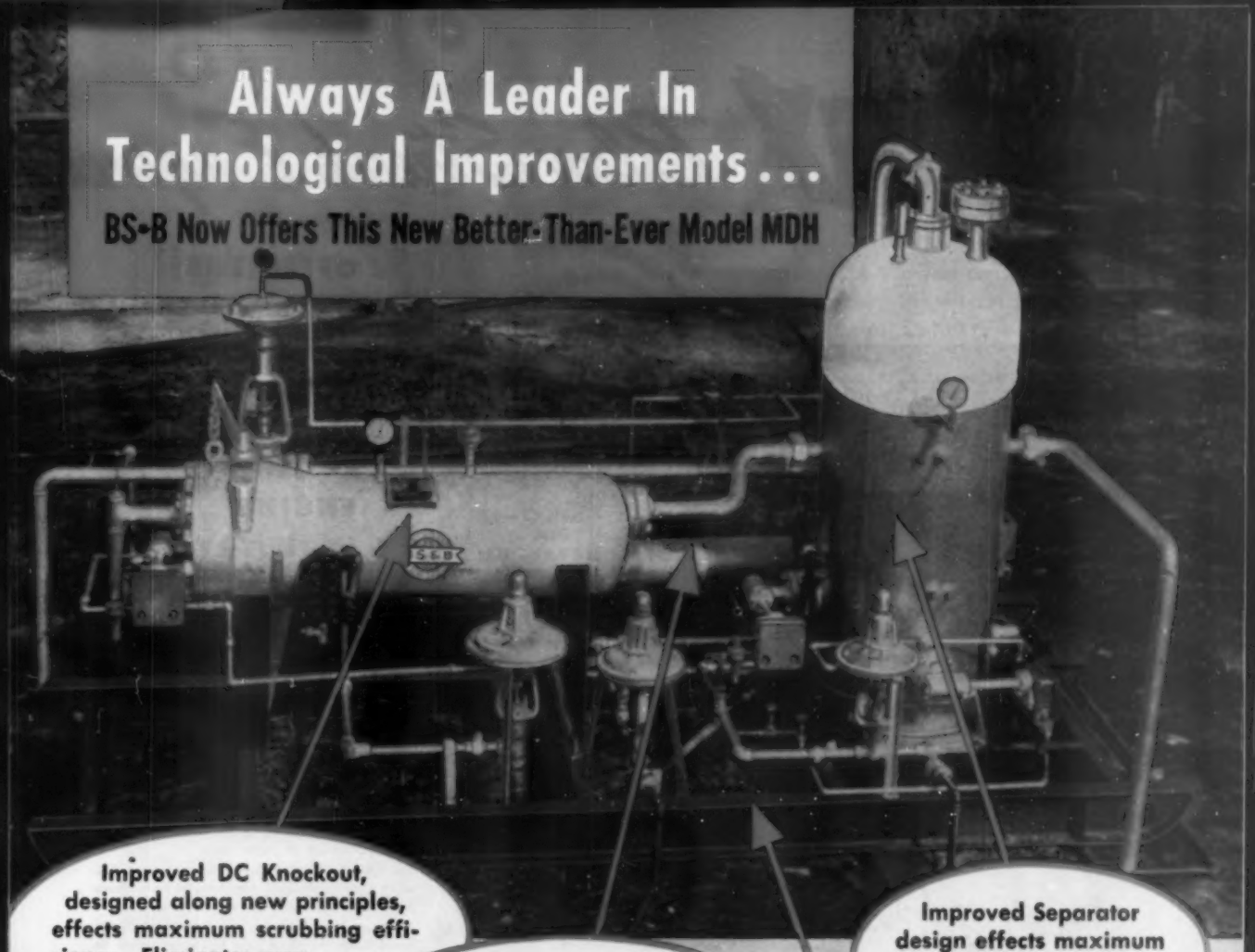
DIAMOND DRILLING BITS More footage, less rig time.

DIAMOND WASHOVER SHOES Fast "Fish" recovery.

CORE BARRELS — The standard of the industry.

Always A Leader In Technological Improvements...

BS&B Now Offers This New Better-Than-Ever Model MDH



Improved DC Knockout, designed along new principles, effects maximum scrubbing efficiency. Eliminates wax and salt water problems.

Efficient heat exchanger, designed specifically for this unit, achieves maximum cooling with minimum pressure drop through counterflow with cold sales gas.

Improved Separator design effects maximum separation of liquids, hydrates and gas.

Skid mounted in a compact assembly that permits shipment of the completely assembled unit. Field hook-up requires only four connections.

BS&B COLD-FRAC SYSTEM

No matter how good a new piece of BS&B equipment may be when first introduced, we are constantly seeking ways and means, born of our field experience and engineering know-how, to make it even better.

While other manufacturers are still offering the same low temperature separation systems they started out with, BS&B can now offer this proved *new* Model MDH COLD-FRAC System with improved features.

For the small lease operator, the BS&B ECON-O-MAX unit offers the same improved separator design as the larger MDH unit. Ask your BS&B Representative for details.

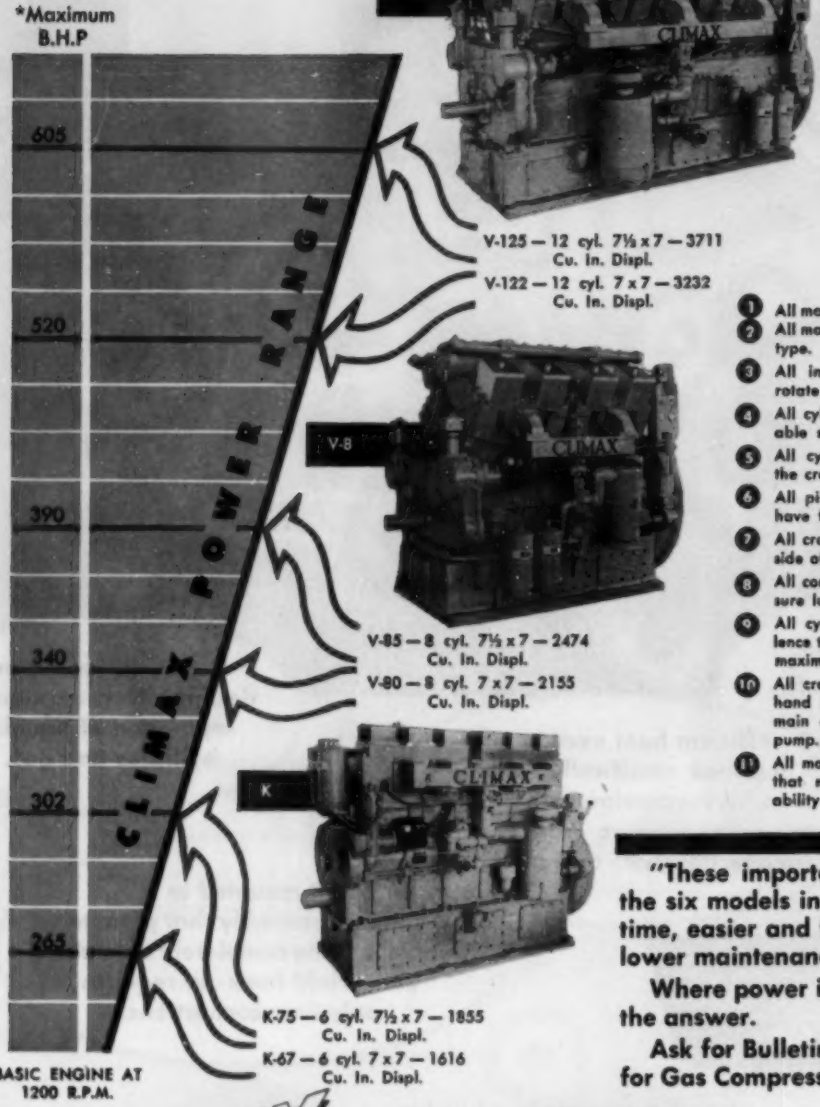
OVER 60 YEARS — BS&B — ANOTHER EXAMPLE OF PRODUCT LEADERSHIP

BLACK, SIVALLS & BRYSON, INC.

Oil and Gas Equipment Division, Dept. 1-C7

1708 West Main Street — Oklahoma City, Oklahoma

climax Blue Streak Engines


*Maximum B.H.P
605
520
390
340
302
265
CLIMAX POWER RANGE
V-12
V-8
K
CLIMAX
V-125 — 12 cyl. 7½ x 7 — 3711 Cu. In. Displ.
V-122 — 12 cyl. 7 x 7 — 3232 Cu. In. Displ.
V-85 — 8 cyl. 7½ x 7 — 2474 Cu. In. Displ.
V-80 — 8 cyl. 7 x 7 — 2155 Cu. In. Displ.
K-75 — 6 cyl. 7½ x 7 — 1855 Cu. In. Displ.
K-67 — 6 cyl. 7 x 7 — 1616 Cu. In. Displ.
*BASIC ENGINE AT 1200 R.P.M.

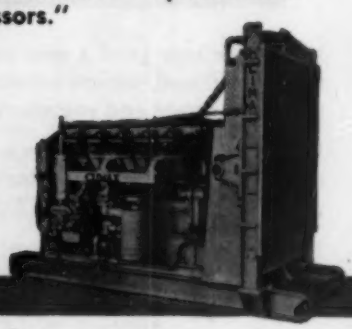
OFFER THE BIGGEST VALUE IN THE ENGINE INDUSTRY

1. All models have 7" stroke.
2. All main and rod bearings are the precision type.
3. All intake and exhaust valves are free-to-rotate type.
4. All cylinder blocks are provided with renewable sleeves.
5. All cylinder blocks are cast separate from the crankcase.
6. All pistons are aluminum, cam ground, and have five rings.
7. All crankshafts have a main bearing on each side of each crankthrow.
8. All connecting rods are rifle drilled for pressure lubrication of piston pins.
9. All cylinder heads have Climax high turbulence type combustion chambers which produce maximum fuel economy.
10. All crankcases and engine bases have large hand holes on each side for easy access to main and connecting rod bearings and oil pump.
11. All models have the Climax consistent design that makes possible maximum interchangeability of wearing parts.

"These important features applying to the six models indicated, mean less down time, easier and faster field servicing and lower maintenance costs.

Where power is your problem Climax is the answer.

Ask for Bulletin SA-611 — "Special Units for Gas Compressors."



climax BLUE STREAK ENGINES

CLIMAX ENGINE AND PUMP MFG. CO.
208 SO. LA SALLE ST. CHICAGO-4, ILL.

FACTORY
CLINTON, IOWA

DISTRICT OFFICE
155 CONTINENTAL AVE.
DALLAS 7, TEXAS

DISTRIBUTORS

Drillers Machine Shop
Oklahoma City, Okla.

General Diesel and Equipment Company
(Formerly Sweeney Bros.)
Williston, North Dakota

Wilson's Engine & Equipment Co.
Bakersfield & Long Beach, Calif.

Stewart & Stevenson Services, Inc.
Houston and 8 Texas Branches

Cullander Machinery Co.
Belzoni, Miss. & West Memphis, Ark.

Tobin Machinery Co.
Lafayette, La.

Vern Walton Co.
Coolidge, Casa Grande & Marana, Ariz.

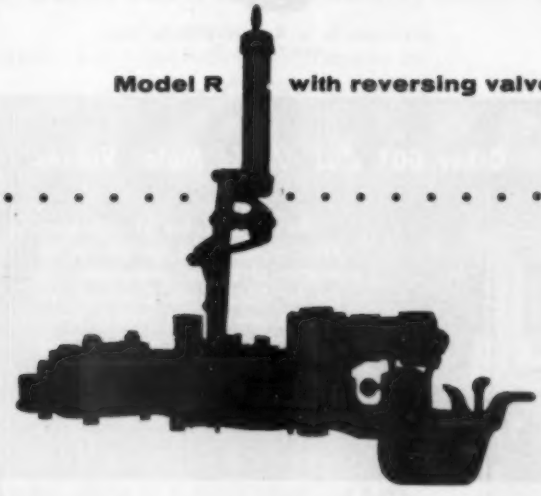
Landes, Zachary and Peterson
Denver, Colo., and 5 Branches

United Power, Inc.
(Formerly United Tool Co.)
Shreveport & Alexandria, La.

introducing a New lighter-weight, low-priced BJ Hydratorc

Byron Jackson – first name in the manufacture of power drilling and production tools for the oil industry – now adds a *new* model to the Hydratorc line of hydraulic tubing tongs. Designed to effect savings in weight, the new Model S offers the time-proven operating efficiencies of the BJ Hydratorc at a lower cost. The reduced weight contributes to easier handling and the popular BJ roll-over feature is provided for "reverse" operation. All of the dependability of BJ Red Iron is built into this new addition to the Hydratorc line. It's another step in the continuing BJ program of putting *more* power to work for you.

Model R with reversing valve...



The Model R Hydratorc has both the roll-over feature for quick convenience in testing joints or changing couplings plus a four-way valve for "reverse" operation in an upright position – especially useful when breaking out long strings of tubing.

Byron Jackson

Division of Borg-Warner Corporation

P.O. Box 2017A, Terminal Annex, Los Angeles 54, California

Houston - Fort Worth - Denver - New York

got

TYPE "DA-TS" PRESSURE REGULATING VALVE

- Accurate Regulation
- Bubble-Tight Closure
- Used with Bourdon Tube Controller

Here's the very latest in oil field pressure regulating valves. This new valve has all of the features that have made GOT Motor Valves the synonym for dependability in oil field service . . . enclosed stem, easily replaceable inner valve with huddling chamber, all-steel construction, simplicity, light weight . . . **plus** high regulating accuracy provided by an improved inner valve design.

Use the Type "DA-TS" Valve for **pressure reducing service** on flowing wells, gas lift wells, lease automation, disposal systems and other installations where constant downstream pressures are required. Reverse the pilot control and use it for **back pressure regulation** in closed compressor systems, separator discharge lines and other services.

Interchangeable orifices (⅛" to 1") permit quick, easy sizing for required capacities and pressures; the huddling chamber affords protection against cutting at the seat and disk; an efficient resilient seal provides bubble-tight closure against gas or liquid in on-and-off applications. Pilot control is provided by proved types of bourdon tube controllers.

Include this valve in your system designs, and profit from the many new features it offers. Complete information may be obtained from your GOT representative or by writing for Catalog No. 256 MVC.

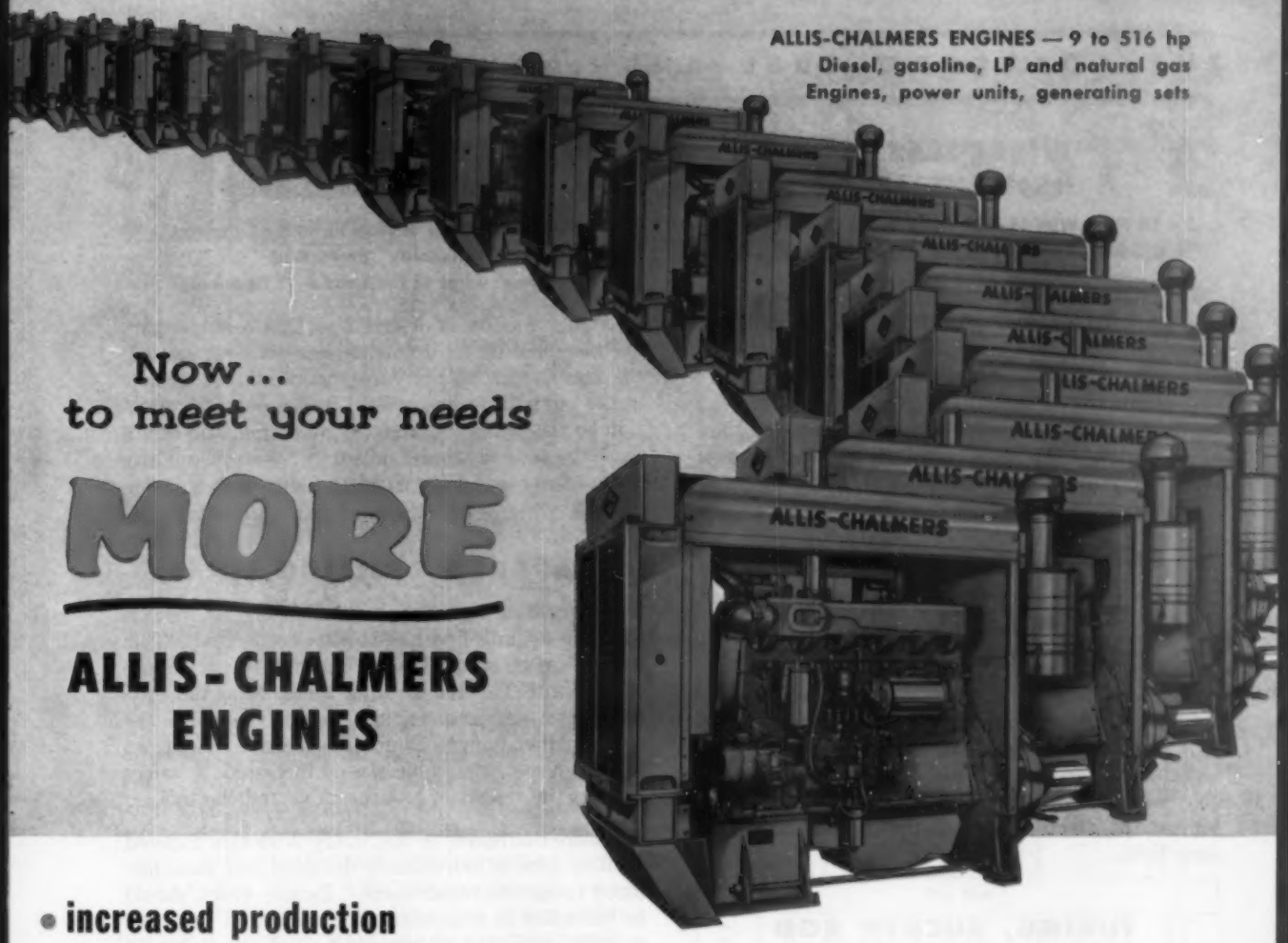
Garrett Oil Tools, Inc.
P. O. BOX 2427 • LONGVIEW, TEXAS

USI
DIVISION OF U. S. INDUSTRIES, INC
New York, N. Y.

Other GOT *Oil Field* Motor Valves

The complete line of GOT Motor Valves includes types and sizes for the majority of oil field requirements in gas and liquid service. Illustrated, left to right, are the Type "DCB-3" Safety Valve, Type "CPO" 3-Way Valve, and Type "DCB-1" Angle Valve. Other types are described in the Motor Valve Catalog. Write for it today.

ALLIS-CHALMERS ENGINES — 9 to 516 hp
Diesel, gasoline, LP and natural gas
Engines, power units, generating sets



Now... to meet your needs

MORE

ALLIS-CHALMERS ENGINES

- **increased production**
- **improved standards**
- **expanded service**
- **greater parts availability**
- **more parts interchangeability**

The production of Allis-Chalmers engines goes up, up, up to meet your needs. The 1956 production is expected to reach an all-time high — and 1955 output was many percent greater than 1954's. A multi-million-dollar expansion of facilities will further boost production.

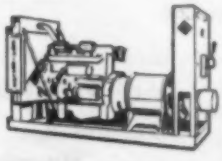
But there are not only *more* engines to meet your needs, there are *better* engines — as Allis-Chalmers research and development continues to pioneer improvements, and as production and inspection standards are set even higher.

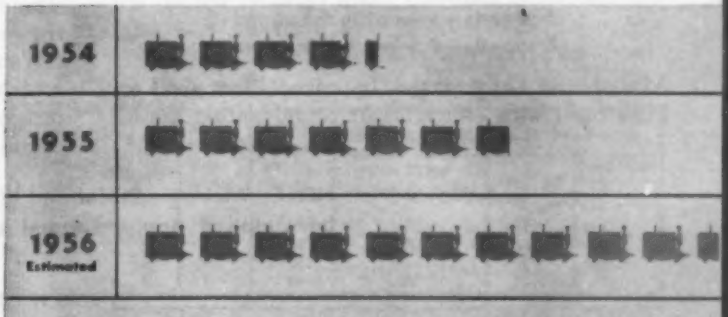
Along with this comes an expansion of customer service and greater parts availability, too, as sources of parts and service are moved closer to you.

More and more, it's Allis-Chalmers engines and service to meet your needs.

ALLIS-CHALMERS, BUDA DIVISION, MILWAUKEE 1, WISCONSIN

A complete line of improved engine generator sets from 5 to 300 kw, for emergency and continuous duty, for marine, cooling tower and industrial use.





The 1956 production of Allis-Chalmers engines will reach an all-time high, with output many percent higher than in previous years.

ALLIS-CHALMERS AC

BE-3

"WISSCOLASTIC" DRILLING LINE

6 x 16 Filler Wire (6 x 21 Filler Wire) Construction
6 strands—21 wires to the strand—1 fiber core

"Wisscolastic" drilling lines have the extra elasticity that's needed for shallow drilling. This elasticity reduces vibration and whipping and provides better absorption of shock loads. Further, "Wisscolastic" drilling lines are "pre-broken-in" at the factory . . . have good drilling qualities from the moment they are installed. Furnished Left Lay unless otherwise specified. Available in Plow Steel and Mild Plow Steel.

SAND AND CORING LINES

6 x 7 Construction
"Wisscolay" Preformed
6 strands—7 wires to the strand—1 fiber core

Sand and Coring Lines of the 6 x 7 construction are furnished in three grades—Gray Strand Improved Plow Steel, Plow Steel and Mild Plow Steel. The higher grades are recommended for deep holes. Available with special "Wisscote" galvanized finish to combat the effects of sour oil that is encountered in some fields.

TUBING, SUCKER ROD OR WINCH LINES

6 x 31 Seale Construction
"Wisscolay" Preformed
6 strands—31 wires to the strand—1 fiber core or 1 Independent Wire Rope Core

For better winding and increased freedom from twisting tendencies, we recommend that the above be specified.

TORPEDO LINES

5 x 5 Construction **5 x 7 Construction**
"Wisscolay" Preformed
5 strands—5 wires to the strand
5 strands—7 wires to the strand

Available in Gray Strand Improved Plow Steel or Plow Steel with either bright or galvanized finish.

TUBING OR SUCKER ROD LINES

18 x 7 Non-Spinning or Non-Rotating Construction
"Wisscolay" Preformed
18 strands—7 wires to the strand—1 fiber core

This construction is designed so that a single part line can pick up an unguided load without causing the load to spin. In this construction, the 12 strands in the outer layer are twisted in the opposite direction to the 6 inner strands to counteract the rope's tendency to unlay under pressure. Available in Gray Strand Improved Plow Steel or Plow Steel.

TAPERED DRILLING LINES

In deep drilling operations, one of the biggest weights that the drilling line has to support is itself. This weight can be reduced considerably through the use of Wickwire Tapered Drilling Lines. Near the tool, these lines are large enough to safely support the tool, small enough to eliminate excessive weight; on the drum end, the cable size is increased to safely support the weight of *both* the cable and the tool.

To assure maximum service, every Wickwire Tapered Drilling Line is individually designed and manufactured to specific requirements. Details which should be furnished in requesting information on this item include: projected ultimate depth of the hole, the weight of the tools (including socket, jars, stem and bit), minimum rope diameter desired and the depth at which the line is to be installed.

PLASTIC COATED FIBER CORES

Sand and Drilling lines containing plastic-coated fiber cores give superior service in fields where heavy loads and fluids are commonly encountered. These specially-developed cores combine all the advantages of both plastic and fiber cores. The fiber center gives the core the advantages found in fiber cores including resiliency, compressibility and excellent strand support. The plastic jacket greatly improves the core's resistance to the damaging effects of water and/or corrosive fluids. Plastic coated fiber cores are commonly supplied in diameters ranging from ½" through 1"; other sizes can be supplied upon request.

NOTE: Wickwire Preformed Wire Ropes can be supplied non-preformed upon request.

WICKWIRE ROPE

THE COLORADO FUEL AND IRON CORPORATION — Abilene (Tex.) • Denver • Houston • Odessa (Tex.) • Phoenix • Salt Lake City • Tulsa
PACIFIC COAST DIVISION — Los Angeles • Oakland • Portland • San Francisco • Seattle • Spokane • WICKWIRE SPENCER STEEL DIVISION — Boston • Buffalo
Chattanooga • Chicago • Detroit • Emlenton (Pa.) • New Orleans • New York • Philadelphia

ROTARY DRILLING LINES

6 x 19 Seale Construction • "Wisscolay" Preformed

6 strands—19 wires to the strand—1 fiber core or 1 Independent Wire Rope Core (IWRC)

Wickwire's 6 x 19 Seale construction with either fiber or IWRC core has proved its ability to give excellent rotary drilling line service when operating under severe conditions such as low safety factors, fast acceleration and overwinding in multiple layers on the drum.

These ropes are supplied "Wisscolay" Preformed to provide better bending life over multiple reeving through the blocks. Further, the rope's relaxed condition reduces whipping and allows more uniform winding on the drum.

The IWRC construction should be used if the line is subjected to crushing on the drum because of a low safety factor. This construction, as used by Wickwire, gives each strand the best support over the entire life of the rope . . . provides maximum core support with a minimum of strand-to-core nicking. In addition, this Wickwire construction has the proper shape to resist severe crushing and heavy peening because it uniformly transmits the crushing forces to the very center of each strand; this allows the individual wires to resist displacement which occurs in some other constructions.

NOTE: We recommend that rotary lines be purchased in longer lengths than are required to string up the blocks for the maximum number of lines used. This permits the line to be cut off at the drum end and moved forward; as a result, wear and fatigue are more uniformly distributed over the entire line and deterioration of the line due to concentrated wear or fatigue at one point is prevented.

Diam. in Inches	Approx. Circum. in In.	Approximate Weight Per Ft. in Lbs.		Breaking Strength in Tons of 2000 Lbs.	
		Fiber Core	Independent Wire Rope Core	Fiber Core	Ind. Wire Rope Core
Gray Strand Or Improved Plow Steel					
1½	4¾	3.60	3.96	92.0	98.9
1⅜	4⅜	3.03	3.33	77.7	83.5
1¼	3⅞	2.50	2.75	64.6	69.4
1⅛	3½	2.03	2.23	52.6	56.5
1	3⅛	1.60	1.76	41.8	44.9
⅞	2¾	1.23	1.35	32.2	34.6
¾	2⅜	.90	.99	23.8	25.6
⅝	2	.63	.69	16.7	17.9
Plow Steel					
1½	4¾	3.60	3.96	80.0	86.0
1⅜	4⅜	3.03	3.33	67.5	72.6
1¼	3⅞	2.50	2.75	56.2	60.4
1⅛	3½	2.03	2.23	45.7	49.1
1	3⅛	1.60	1.76	36.4	39.1
⅞	2¾	1.23	1.35	28.0	30.1
¾	2⅜	.90	.99	20.7	22.2
⅝	2	.63	.69	14.5	15.6

CABLE TOOL DRILLING LINES

6 x 21 Filler Wire Construction

6 strands—21 wires to the strand—1 fiber core

This construction gives superior service over the old 6 x 19 Warrington construction which was formerly used for this type of operation. Its superior service is largely due to the fact that only large wires are used in the outer layer of each strand while the Warrington construction alternated large and small wires in this layer.

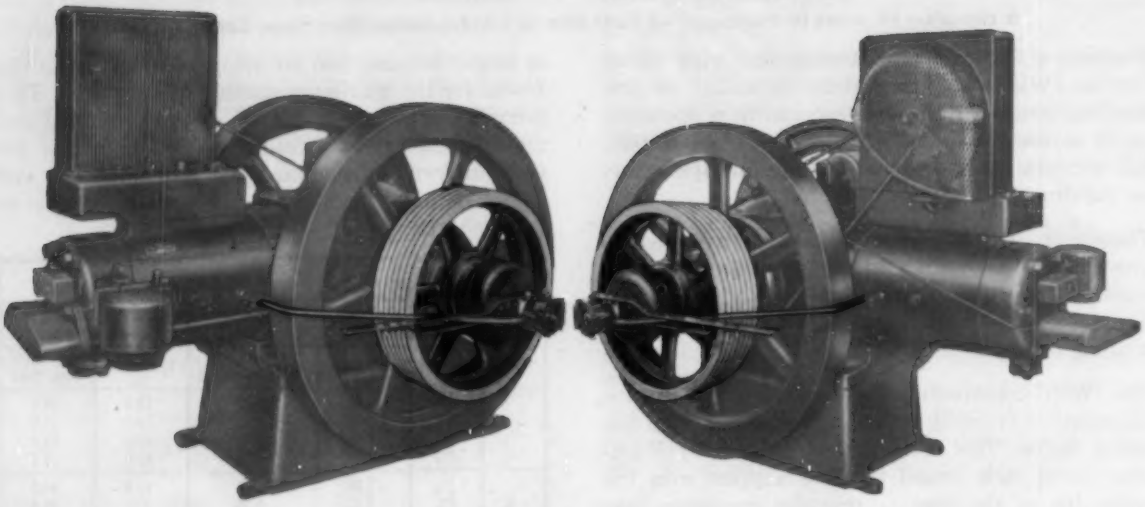
Specific advantages gained through the use of the Filler Wire construction include:

1. Increased abrasion resistance with no sacrifice of fatigue resistance.
2. Increased resistance to crushing and flattening on the drum.
3. More uniform distribution of stresses.
4. Same initial cost.

Drilling lines of this construction are usually furnished Right Lay for Midcontinent Fields; Left Lay for Eastern, Rocky Mountain and California Fields. Can be supplied with a "Wisscote" galvanized coating for use in fields where corrosive conditions are present. Available in three grades—Gray Strand Improved Plow Steel, Plow Steel and Mild Plow Steel.

Diam. in Inches	Approx. Circum. in Inches	Approx. Weight Per Foot in Lbs.	Breaking Strength in Tons of 2000 Pounds		
			Gray Strand Improved Plow Steel	Plow Steel	Mild Plow Steel
1	3⅛	1.60	41.8	36.4	31.6
⅞	2¾	1.23	32.2	28.0	24.3
¾	2⅜	.90	23.8	20.7	18.0
⅝	2	.63	16.7	14.5	12.6

Here...or here...



on the "ZC"

The clutch and sheave can be mounted on either end of your Fairbanks-Morse ZC engine crankshaft—whichever end will position the engine most conveniently on the floor plan of your pumping rig. This feature, unique in the ZC, makes for safety of operation and ease of service.

The Fairbanks-Morse ZC engine has TWO flywheels. However you mount the clutch and sheave, there will be the smoothing effect of a flywheel between the engine and the fluctuating power demand of the pump jack. This makes for better balance and more economical operation.

There are six sizes of ZC engines, from three horsepower to 30. See your local supply store or write Fairbanks, Morse & Co., Oil Field Division, 600 South Michigan Avenue, Chicago 5, Illinois.

FAIRBANKS-MORSE

a name worth remembering when you want the BEST

OIL FIELD EQUIPMENT • PUMPS • SCALES • ELECTRIC MOTORS • GENERATORS • LIGHT PLANTS • DIESEL, DUAL FUEL AND GASOLINE ENGINES • MAGNETOS • DIESEL LOCOMOTIVES

Specially Designed for
• Offshore Operations
• Tenders • Steamships
• Barges

UNIT MARINER

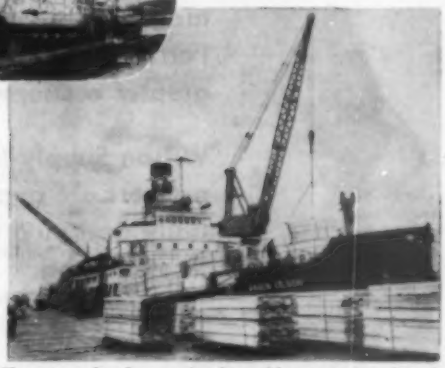
Designed to operate from a fixed mounting, the UNIT MARINER delivers dependable and economical performance aboard offshore equipment. Cargo is conveniently transferred from tender to platform.

THE NEW APPROACH TO CARGO HANDLING!

Meets all requirements for cargo handling from a fixed mounting as applied to ships, barges, or offshore oil platforms.

BEFORE

AFTER



The net results of converting from old type rigging: Speeds up cargo handling — reduces idle port time — cuts maintenance cost. These self-contained MARINERS operate independently of ship's power.

Features incorporated in the MARINER design include: One-piece cast gear case — a protection against salt spray • Self-aligning centerpost trunnion • Turntable load rollers plus replaceable hook shoes • Large diameter roller path • Worm type independent boom hoist • Large diameter swing brake • Disc type clutches • Straight-in-line engine mounting with torque converter plus many other important features. The LIFT and CONTROL ability of the MARINER permits loading and unloading with speed and accuracy. The full range vision safety cab enables the operator to see what he is doing at all times. Here's a machine constructed for your type of Cargo handling. Get the facts.

Write for: Bulletin MO-200 for Offshore Platforms
MS-200 for Ships and Barges

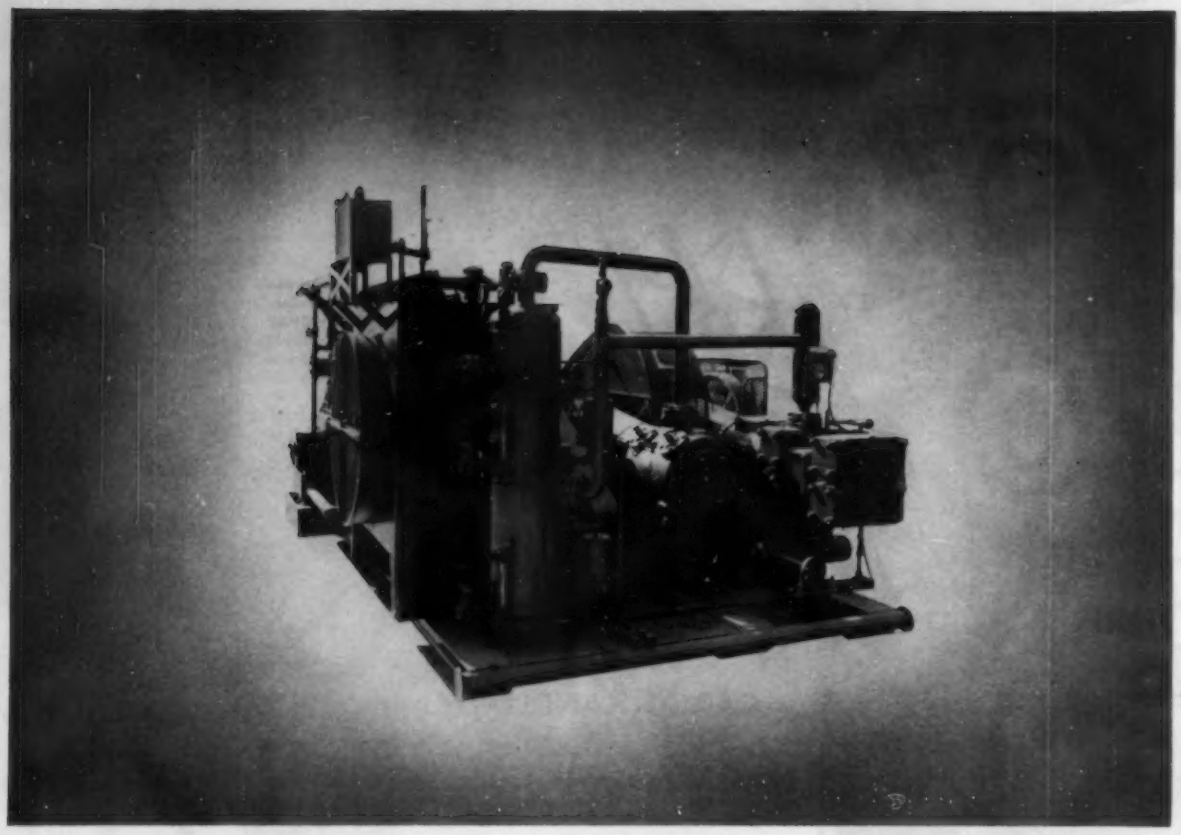
UNIT CRANE & SHOVEL CORP. UNIT MILWAUKEE WISCONSIN

UNIT CRANE & SHOVEL CORPORATION

6603 WEST BURNHAM STREET • MILWAUKEE 14, WISCONSIN, U. S. A.

A 8881-1PB

SHOVELS • DRAGLINES • CLAMSHELLS • CRANES • TRENCHOES • MAGNETS



PROFITS

Because quality engineering and experienced craftsmanship are part of your Wilson Supply Company Portable Packaged Compressor — you are assured of greater economy. Performance is the pay off.

Wilson Supply-Ingersoll-Rand Packaged Postable Compressors are available in a wide range of sizes, individually designed to your use for Gas Lift, Sales Gas and Repressuring.

•

Write or Telephone

COMPRESSOR DIVISION

P. O. Drawer 19 **CA 5-0471**

BRANCH STORE

TEXAS: Alice, Corpus Christi, Victoria, McAllen, Bay City, Columbus, Barbers Hill, Liberty, Beaumont, Kilgore, Sherman, Odessa. LOUISIANA: Lake Charles, New Iberia, Houma, Harvey, Shreveport.

SALES OFFICES

DALLAS SHREVEPORT SAN ANTONIO
TULSA NEW ORLEANS LAKE CHARLES
CORPUS CHRISTI MIDLAND

WILSON SUPPLY CO
HOUSTON, TEXAS

Get greater profits
starting with your next fracture job

Adomite*

Adomite is a revolutionary fluid-loss control additive for converting lease crudes to superior fracturing fluids. It has already been used successfully in over 1,000 fracture jobs in different fields.

Ask your service company to use Adomite on your next fracture job

© Continental Oil Company

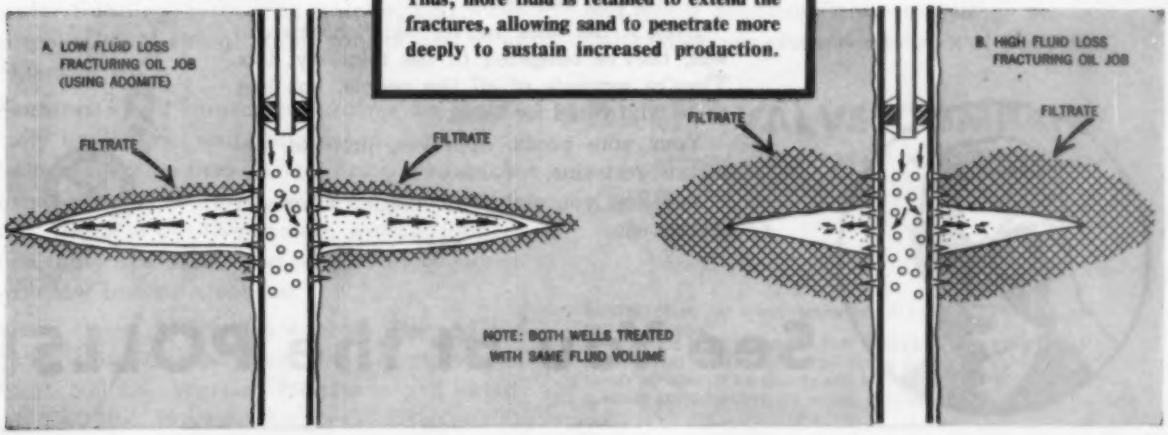
HOW ADOMITE BENEFITS PRODUCERS

- Effectively seals the fracture face and practically prevents loss of fluid into the producing formation.
- Results in longer fractures and deeper penetration of sand for a given job.
- Cleans up rapidly. Does not contaminate the produced oil or the formation.
- Greater sustained production with a given fluid volume at lower cost.
- Equally effective in oils which have or have not been treated with emulsion breakers.
- Easy to use. Adomite is a dry material in flake form. It is mixed directly into the crude or gelled crudes on the lease, using only standard mixing equipment.

HOW IT WORKS

Adomite retards fluid loss into the formation. Thus, more fluid is retained to extend the fractures, allowing sand to penetrate more deeply to sustain increased production.

*Trade-mark, Continental Oil Company


A. LOW FLUID LOSS FRACTURING OIL JOB (USING ADOMITE)
FILTRATE
FILTRATE
B. HIGH FLUID LOSS FRACTURING OIL JOB
FILTRATE
FILTRATE
NOTE: BOTH WELLS TREATED WITH SAME FLUID VOLUME

here's how you "govern" the government

Much as we revere and respect this system of ours, we don't want the government running our lives.

The best government is one that's closest to the people. And there's just one way to keep it under control.

Vote.

Every time you get a chance.

Vote November 6, for sure.

Vote to elect the ones you want representing you. To keep the ones who are doing you proud. To get rid of the ones who are not so hot.

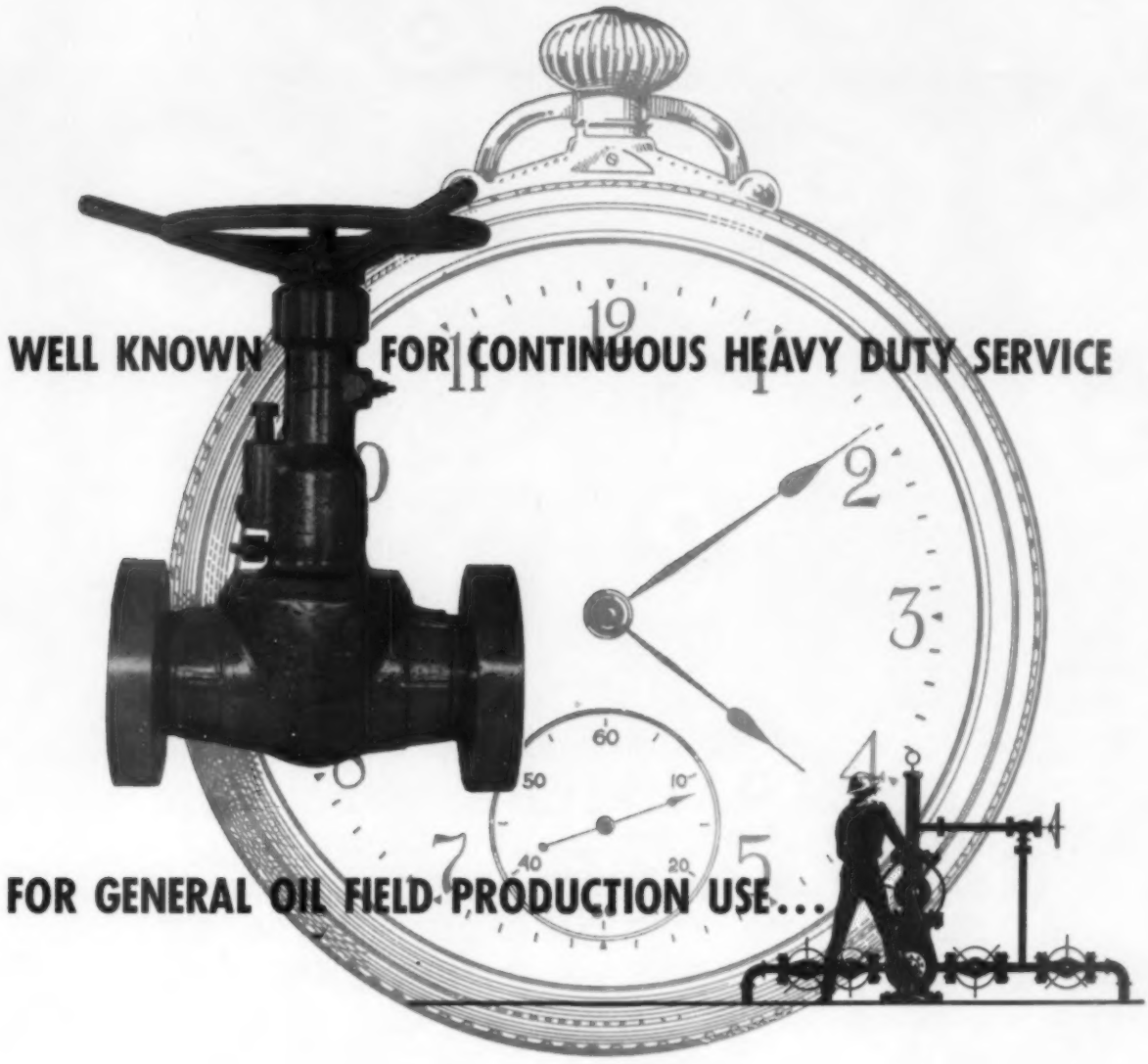
You're the boss, however you vote. No matter who's elected, you pay their salaries and paint their offices and keep watching over them as they work.

Even if the ones you're "agin" happen to win, they're obligated to the minority, too. They're servants of *all* the people, not just those who voted for them.

Your vote prods, approves, protests, demands, restrains, rewards.

Vote—so you and your children after you always can.

See You at the POLLS!



WELL KNOWN FOR CONTINUOUS HEAVY DUTY SERVICE

FOR GENERAL OIL FIELD PRODUCTION USE...

Applications: Meter runs, Christmas Trees, flow lines, separators, treaters, manifold systems, water flooding, gathering systems, salt water disposal, dual string tubing control and many others.

Features: Orbit Forged Steel Valves are specifically engineered and designed for general oil field production uses. Orbit has a well established reputation based on actual performance that provides positive seating without lubrication, easy operation, and long years of service with low cost maintenance.

Sizes: 1, 1½, 2, 2½, 3 & 4 inches, Flanged and Screw ends, Carbon Steel and Stainless Steel Trim. 500 lbs., Working Pressure to and including 5000 lbs., Working Pressure.

For greater service to the petroleum industry, Orbit has strategically located field warehouses and highly qualified field men. When you buy Orbit valves you also buy service at no extra cost.

ORBIT VALVE COMPANY

P. O. BOX 699 • TULSA 1, OKLAHOMA

ORBIT VALVES ®

HOUSTON, TEXAS 407 Velasco (Serving the Gulf Coast)
CASPER, WYOMING
247 West First Street (Serving the Rocky Mountain States and Canada)
ODESSA, TEXAS 402 West County Road (Serving West Texas)
EXPORT REPRESENTATIVE: 500 Fifth Ave., New York 36, N. Y. Ph. BRyant 9-2236
CANADIAN REPRESENTATIVE: 536 8th Ave. West, Calgary, Alberta, Canada Ph. 3-0437

No Slush Pump Manufacturer...

No Manufacturer of Slush Pump Parts...

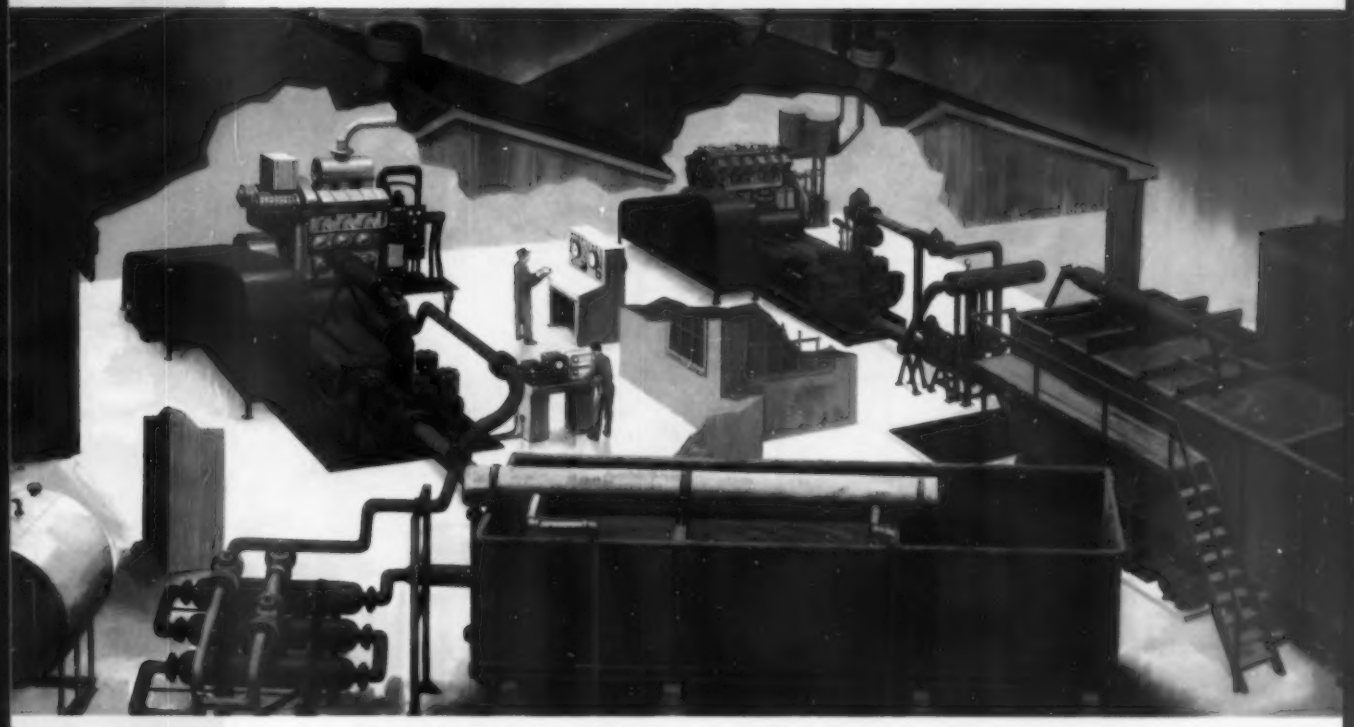
Has a Research Department and Test Pump Laboratory comparable to MISSION.

Why can MISSION Afford this Cost?

MISSION manufactures more fluid end slush pump parts than the combined production of all manufacturers of slush pumps and all manufacturers of slush pump parts in the world.

With the knowledge MISSION gains from this research and continual testing, MISSION produces the finest parts available. This results in more economical and efficient operation of your pumps.

Nothing but the finest will



Only Mission has a fully instrumented test pump "laboratory" like this...

No other pump parts manufacturer has such an advanced setup. These test pumps at the Mission main plant are fitted with the latest in electronic test instruments including a 14-channel recording oscillograph. This instrument is, to the Mission Research Engineer, what an electrocardiograph is to a doctor! Here, Mission research men conduct tests using a variety of contaminated or sand laden muds at temperatures that average 155°F and pressures that often exceed 2,000 psi. Without these test pump facilities, it would have been impossible to have developed the Mud Monarch Valve whose superiority has been proved in hundreds of field installations.

bear the name of MISSION MANUFACTURING CO.

MISSION MANUFACTURING CO. • P. O. Box 4209 • Houston, Texas • Cable Address—"Missco" • Export Office: 30 Rockefeller Plaza, New York
In The United Kingdom: MISSION MANUFACTURING CO., LTD. • 17 Hanover Square • London, W. I. England • Cable Address—"Missoman"

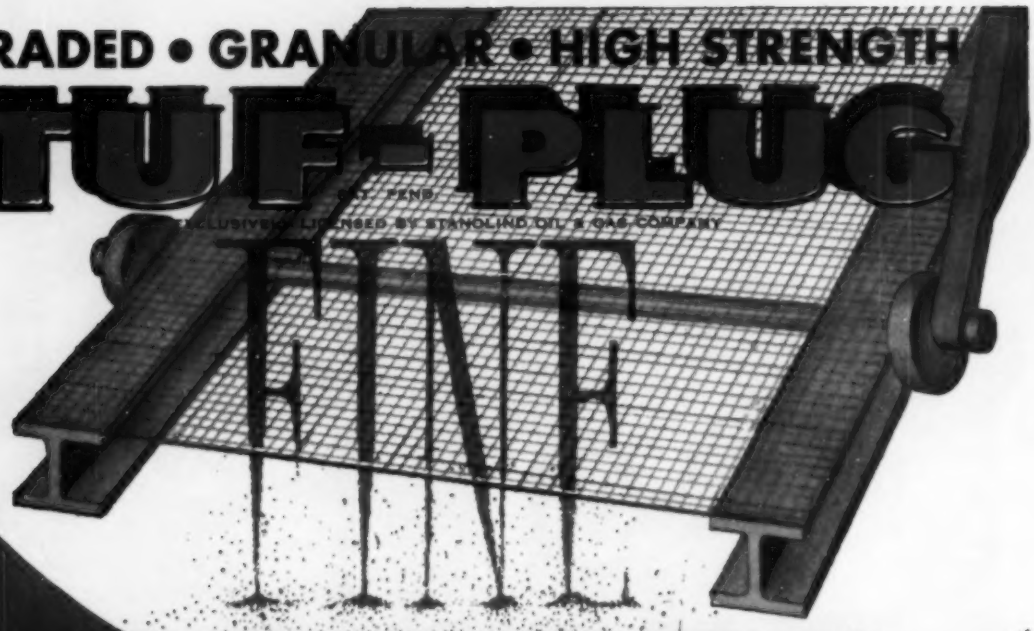
Slush Pump Valves • Valve Springs • Valve Seat Pullers • Pistons • Piston Rods
Liners • Gland Packings • Slips • Swabs • Centrifugal Pumps • Plug Valves

GRADED • GRANULAR • HIGH STRENGTH

TUF-PLUG

REG. U.S. PAT. OFF.

EXCLUSIVELY LICENSED BY STANOLIND OIL & GAS COMPANY



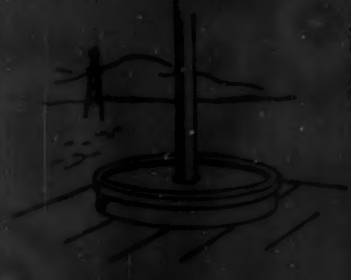
THROUGH THE SHAKER SCREEN

. . . engineered for lost circulation control

- ★ HIGHER STRENGTH SEAL
- ★ LASTS LONGER
- ★ SEALS F-A-S-T-E-R
- ★ LOWEST MAINTENANCE COST
- ★ PERMITS MUD WEIGHT BUILD-UP WITHOUT FORMATION BREAKDOWN

. . . and friction reduction

- ★ LOWERS DRILL PIPE TORQUE
- ★ DECREASES PIPE DRAG DURING TRIPS
- ★ IMPROVES LUBRICATING PROPERTIES OF DRILLING FLUID



DRILL PIPE TORQUE REDUCED MORE THAN 65% IN THE FIELD! To a drilling fluid already containing diesel oil and graphite, the addition of 1 pound of Tuf-Plug Fine per barrel further reduced drill pipe torque from 3 turns to less than 1 turn.

Available through your local mud and service companies

CHEROKEE LABORATORIES, Inc.

HOME OFFICE AND MANUFACTURING PLANT IN TULSA, OKLAHOMA
BRANCHES: MIDLAND, OKLAHOMA CITY, CORPUS CHRISTI, NEW ORLEANS, LAFAYETTE, LA., CASPER

The odds are it's a LUFKIN

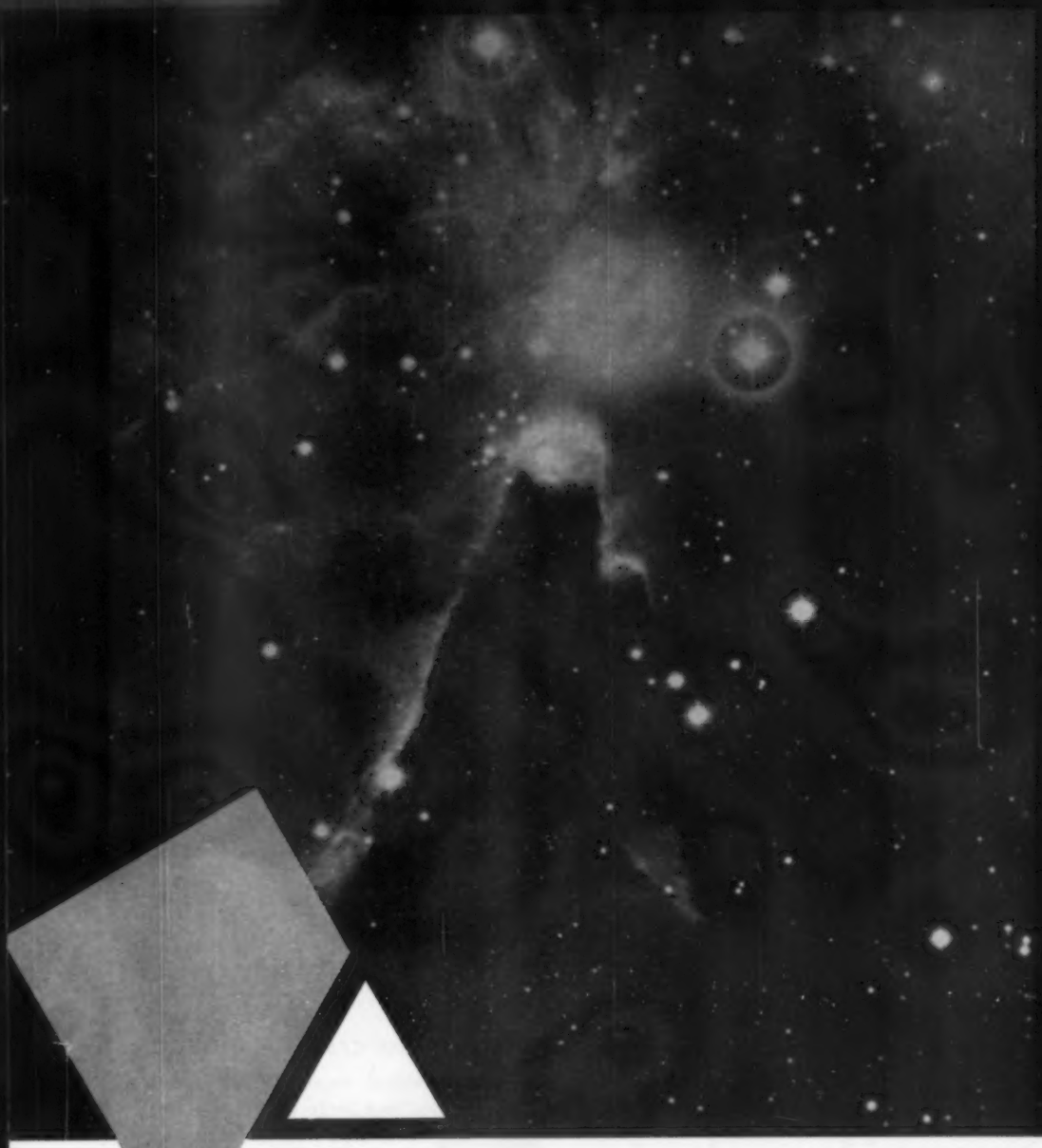
Feet that move at your command

anywhere . . . anytime
trained specialists of the TOTCO service organization will answer your call for assistance in the field. They are just as reliable as the famed TOTCO recorders which give the ultimate in trouble-free service.

TOTCO

Technical Oil Tool Corp., Ltd. • *1057 North La Brea Avenue, Los Angeles 38, California*

Exclusive Distributors: *California*—The Republic Supply Co. of California; *Domestic*—The Continental Supply Company; *Canada*—Oil Well Supply Company; *Export*—Lucey Export Corp., New York City



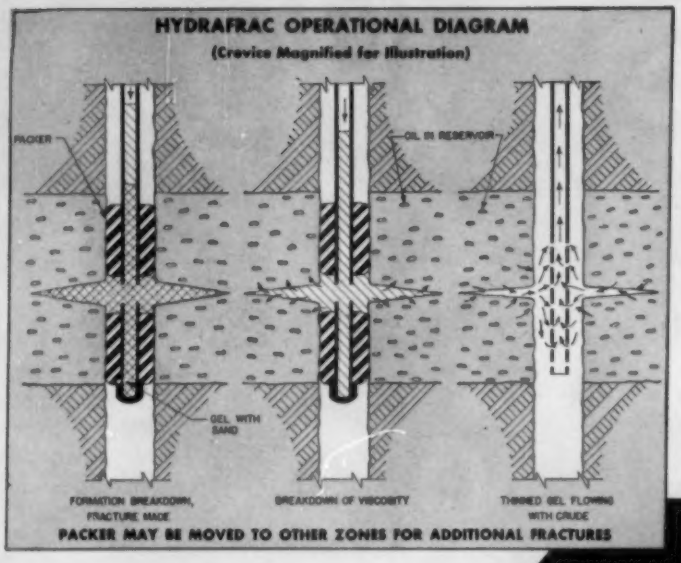
The "Cone Nebula" in the constellation of Monocerus photographed through the 200-inch Hale telescope of the Palomar Observatory. This mass of stars is about 1,000 light-years, or roughly six million billion miles from the earth.

MEASURING THE UNSEEN

Although attempting nothing so spectacular as measuring unseen stars through a 200-inch telescope, Tuboscope research is paying off for oil men everywhere. From Tuboscope research have come new instruments for measuring the nearly unseen effects of wear, fatigue, and corrosion in oilfield tubular goods. And from Tuboscope experience in the field comes the ability to inspect and to grade your tubular goods with the greatest possible precision and with the least chance for human error. The important factors of bottom hole pressure and temperature are measured by Tuboscope's Subsurface Engineering Division.

2919 HOLMES RD. • HOUSTON, TEXAS

Tuboscope COMPANY


HYDRAFRAC OPERATIONAL DIAGRAM
(Crevice Magnified for Illustration)
PACKER
OIL IN RESERVOIR
GEL WITH SAND
FORMATION BREAKDOWN, FRACTURE MADE
BREAKDOWN OF VISCOSITY
THINNED GEL FLOWING WITH CRUDE
PACKER MAY BE MOVED TO OTHER ZONES FOR ADDITIONAL FRACTURES

HOW SELF-BREAKER HELPS FRACTURING

HALLIBURTON'S HYDRAFRAC PROCESS

Still most effective for boosting production in many types of wells is the original Hydrafrac service... Halliburton's *self-breaking* fracturing fluid. Especially for shallow to medium depth wells with medium to low bottom hole pressures.

Carrying fluid used in a Hydrafrac job *goes into well thick... breaks in the formation... comes out thin.*

BENEFITS OF VISCOSITY REDUCTION

In its thick stage, Hydrafrac fluid can successfully suspend high ratios of sand while pumping down hole, even under most conditions of low injection rates.

After thinning, fluid is easily produced from formation. The self-breaking feature is designed to reduce costly cleanup operations after fracturing is completed. The carrier is compatible with almost every known formation fluid.

7-YEAR RECORD OF SUCCESSES

There have been substantial, long-lasting increases in oil and gas recovery in a *large majority* of the many thousands of wells treated with Halliburton's Hydrafrac process... the *only* fracturing method with seven years of outstanding successes in the field.

When production rates are unsatisfactory, it may pay you handsomely to talk to a trained Halliburton fracturing operator about a treatment with self-breaking Hydrafrac fluid. Call your local or district office of the Halliburton Oil Well Cementing Company.

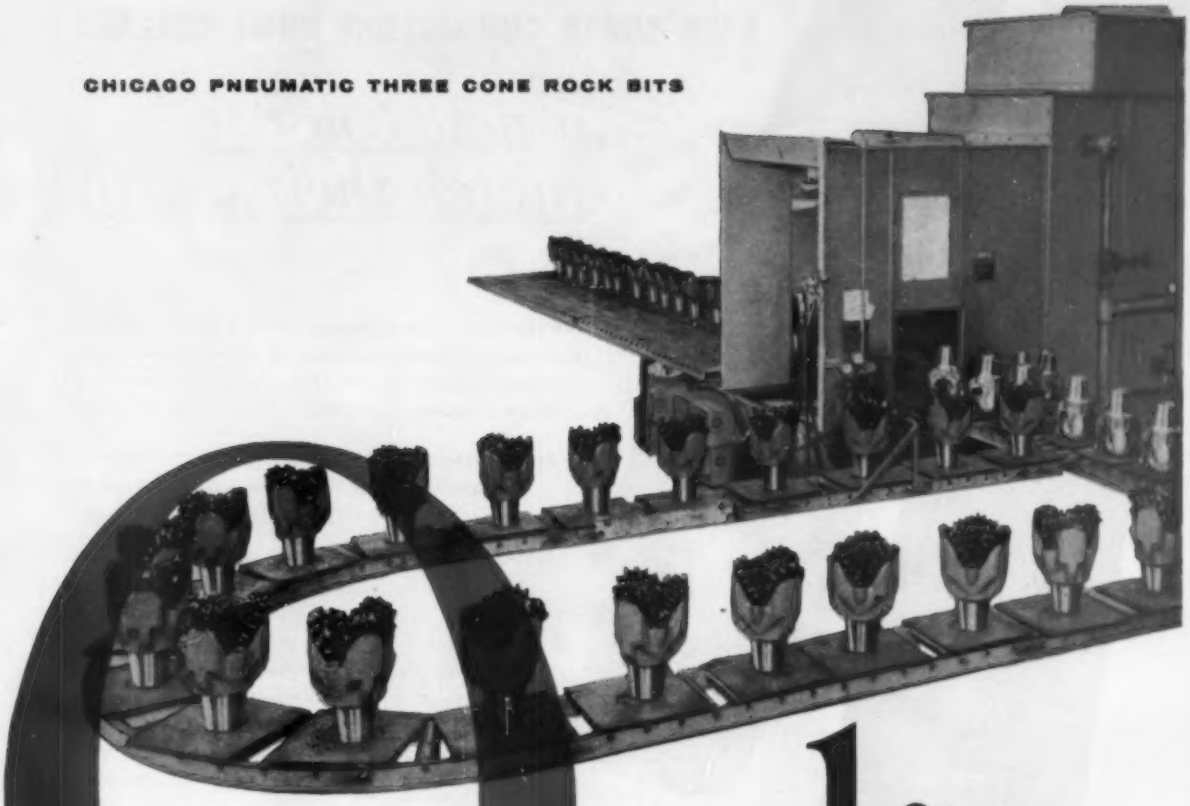
COMPLETE DATA SENT ON REQUEST

Get this valuable information for your Halliburton Service File

HALLIBURTON
FRACTURING SERVICES

250 SERVICE CENTERS – JUST MINUTES AWAY FROM ANY RIG

CHICAGO PNEUMATIC THREE CONE ROCK BITS



Quality

in the making

Oil Tool Division, Chicago Pneumatic Tool Co., 5000 U. S. Highway 81 South, Fort Worth, Texas

Chicago Pneumatic

GENERAL OFFICES: 8 East 44th Street, New York 17, N. Y.
IN MEXICO: D. R. Rosas Moreno No. 41, Mexico City, D. F., Mexico
IN CANADA: 10103 81st Ave., So. Edmonton, Alberta, Canada
PETROLEUM MACHINERY CORPORATION: 30 Rockefeller Plaza, New York 20, N. Y.
(Export Agent, exclusive of Mexico and Canada)

THREE CONE BITS • REAMING BITS • REAMERS • DRILL COLLARS • TOOL JOINTS • SUBS • JUNK BASKETS

REED SUPER CONNECTION DRILL COLLARS

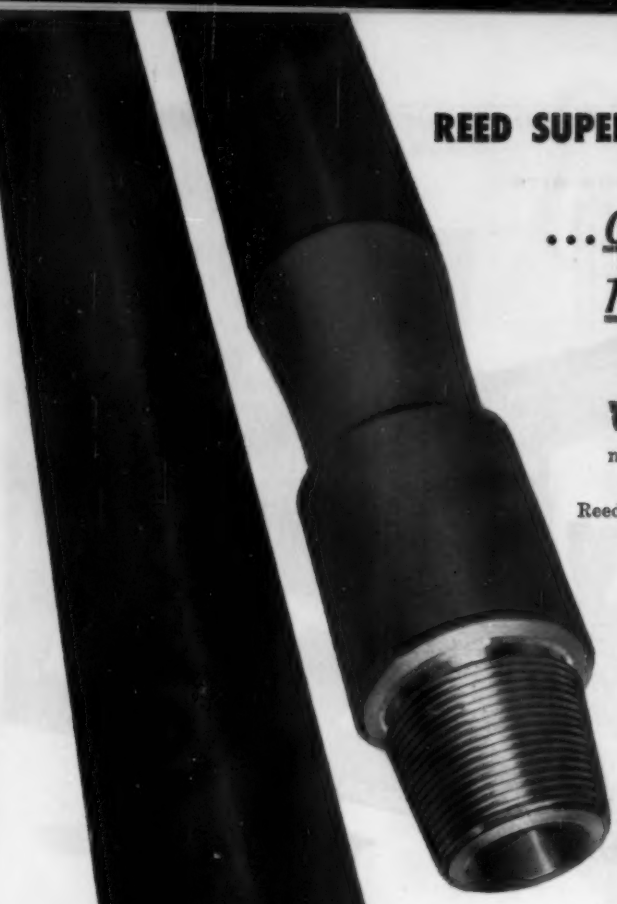
...*a new color to match their worth*

When long use or accidental damage finally makes it necessary to replace the threaded connector on a Reed Super Connection Drill Collar, many operators say Reed Super Connectors are "worth their weight in gold."

Appropriately, gold is the new color of the land and Super Connector . . . for easy identification in the supply store and in your yards.

By replacing the Super Connector—by hand—right at the rig, you have the economical solution to an expensive problem: First, you save on transportation costs—the greater the distance the more you save. Second, you save the cost of shopping and rethreading your drill collar. Third, you reduce down time by simply having a few spare Super Connectors on hand when replacement becomes necessary.

Along with these important savings, a Reed Super Connection Drill Collar is your assurance of factory quality and full safety throughout its long service life.



REED

ROLLER BIT COMPANY

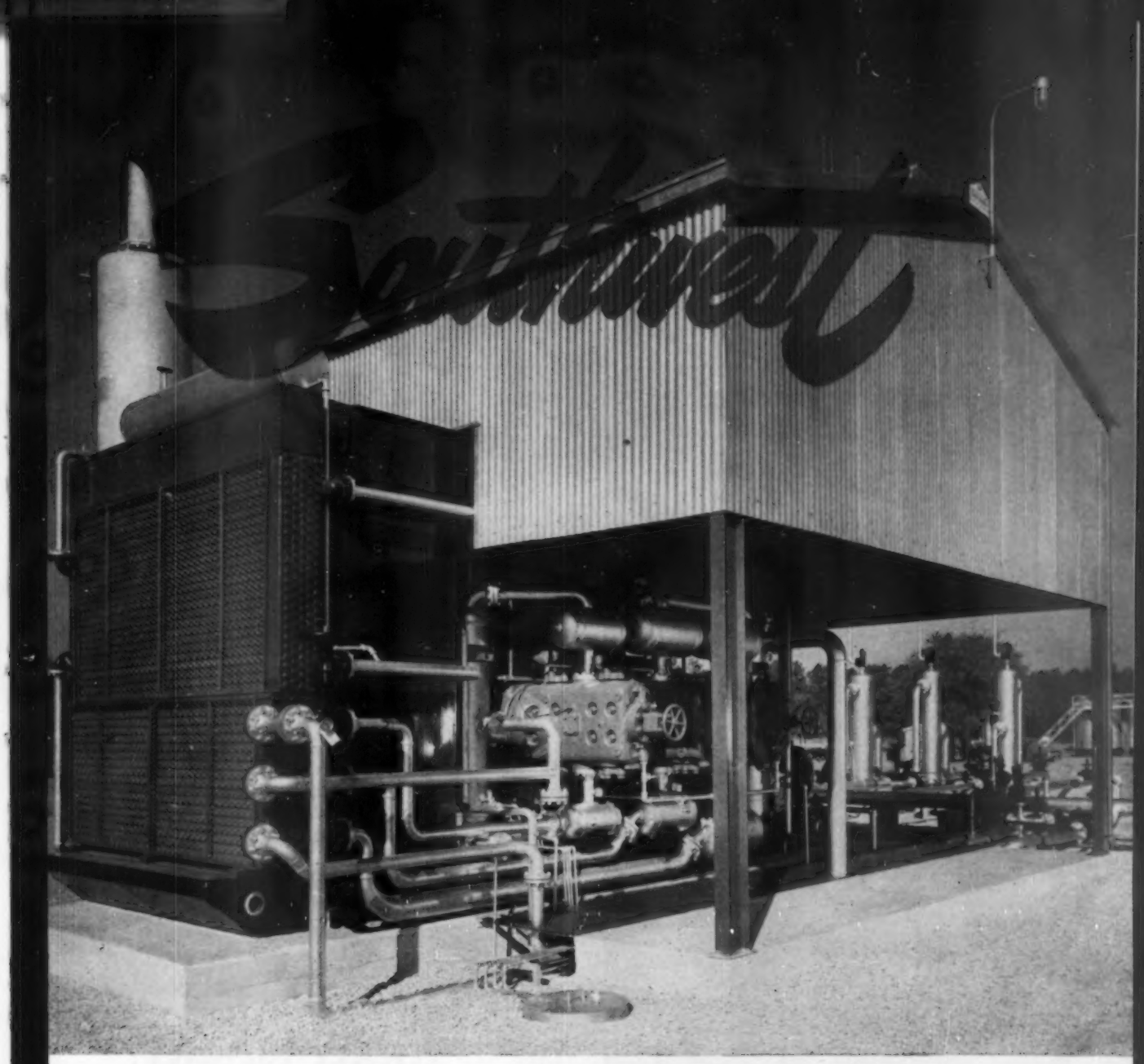
HOUSTON 1, TEXAS

Write for bulletin DC555. This Bulletin will give you specifications, dimensions, weights, torque tables and other drill collar use data. The book also contains pointers on care and maintenance.

Also: Distributors for Martin-Decker Products in the Gulf Coast, Mid-Continent, and Rocky Mountain areas, and in Canada.

NEW YORK LONDON BUENOS AIRES

6231



DESIGNS, ENGINEEERS and BUILDS COMPLETE PACKAGED GAS COMPRESSOR PLANTS

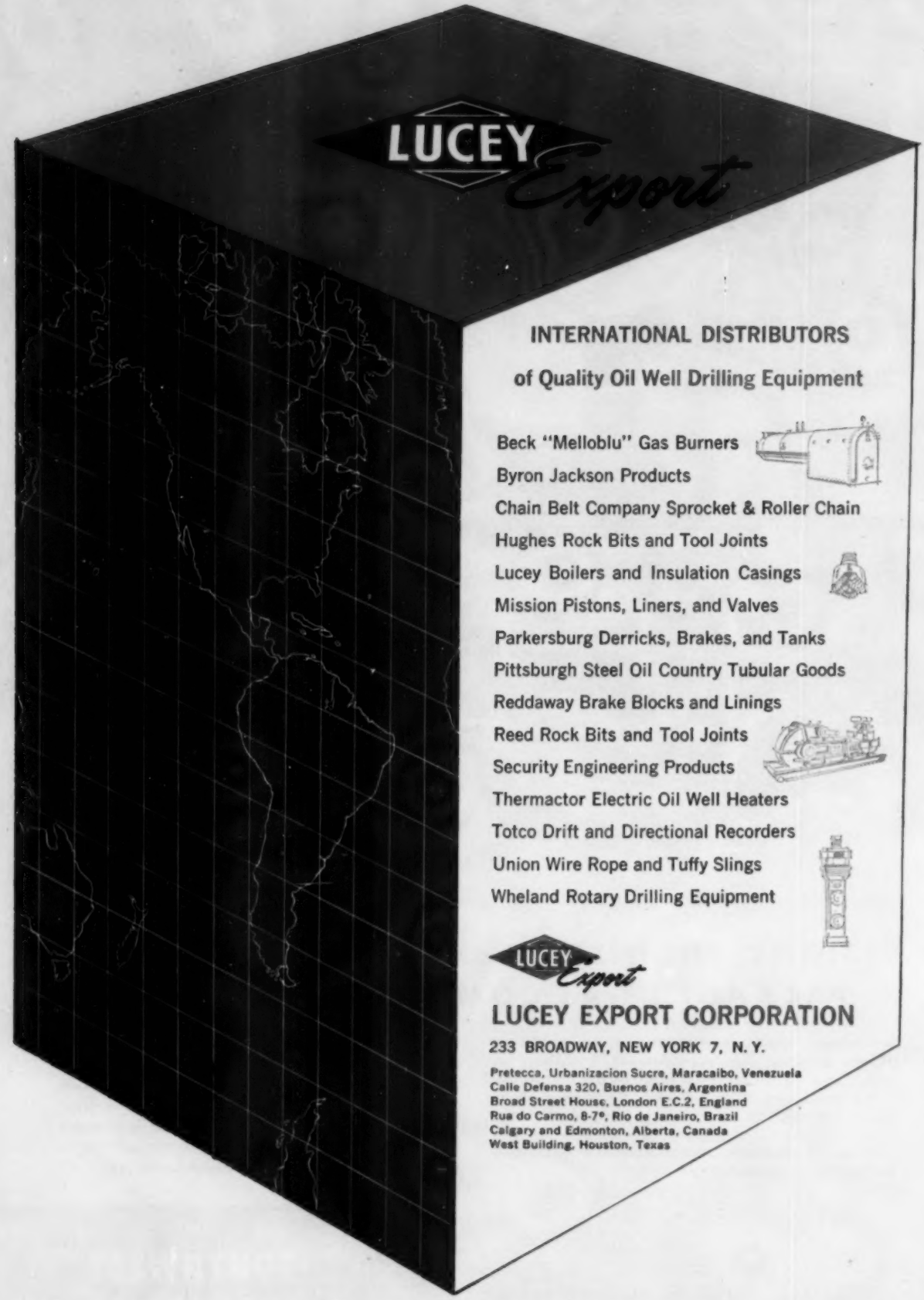
Southwest erects complete gas compressor plants: engineering, compressors, building, on one purchase order and with single responsibility from beginning to end. Southwest does the complete job in building compressor stations afloat, on platforms, or on land giving you faster delivery, lower *installed* cost, and undivided responsibility.

The unattended operation, possible with the automatic controls and safety devices on Southwest Packaged Compressor Plants, cuts operating cost per horsepower-hour to a fraction of the cost of a fully attended stationary installation. A Southwest engineer can show you actual comparative operating costs.

FOR GAS LIFT, GAS BOOSTER, PAESSURE MAINTENANCE AND SIMILAR PROJECTS

SOUTHWEST INDUSTRIES, INC.

Post Office Box 7773, Houston 7, Texas



INTERNATIONAL DISTRIBUTORS

of Quality Oil Well Drilling Equipment

Beck "Melloblu" Gas Burners
Byron Jackson Products
Chain Belt Company Sprocket & Roller Chain
Hughes Rock Bits and Tool Joints
Lucey Boilers and Insulation Casings

Mission Pistons, Liners, and Valves
Parkersburg Derricks, Brakes, and Tanks
Pittsburgh Steel Oil Country Tubular Goods
Reddaway Brake Blocks and Linings
Reed Rock Bits and Tool Joints

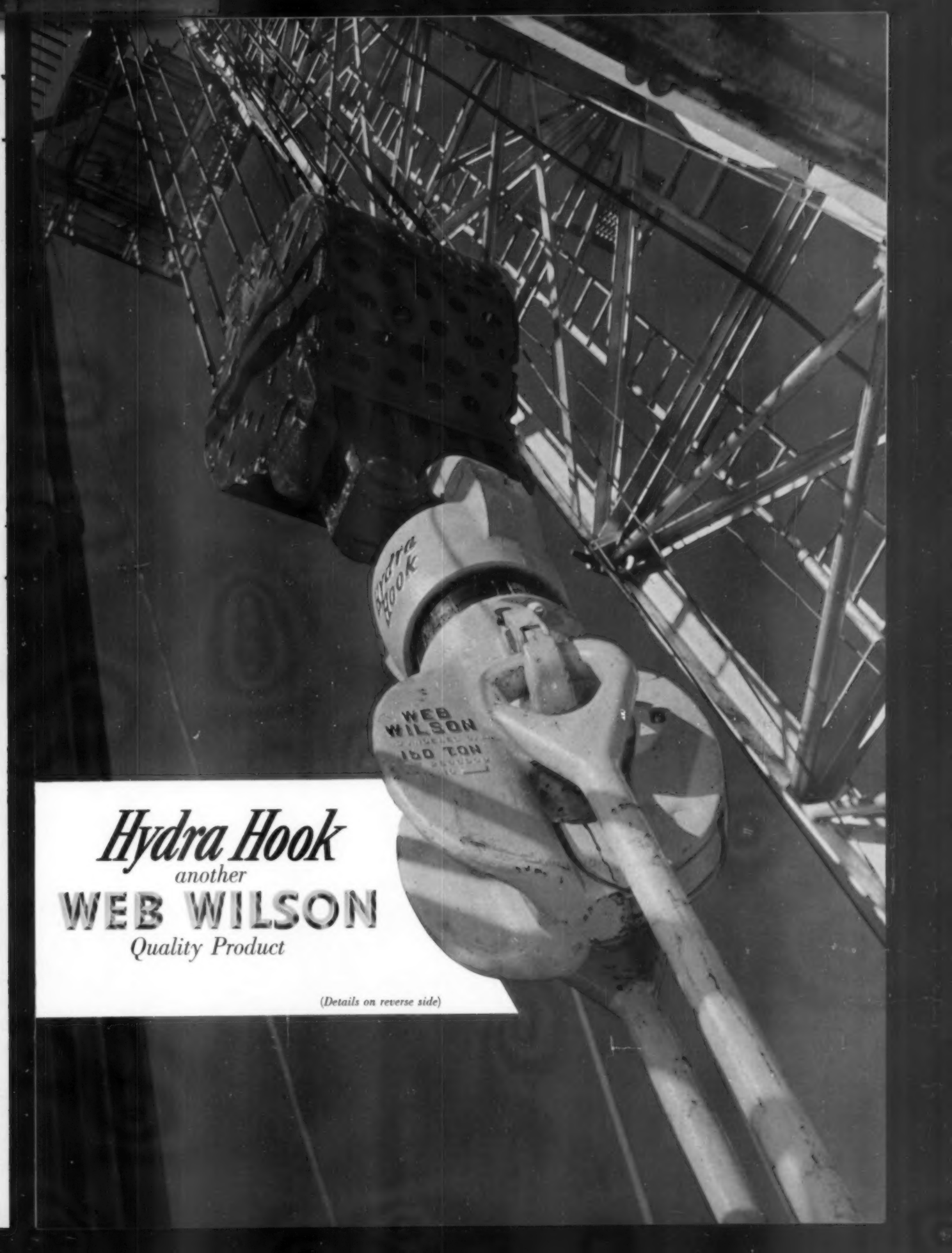
Security Engineering Products
Thermactor Electric Oil Well Heaters
Totco Drift and Directional Recorders
Union Wire Rope and Tuffy Slings
Wheland Rotary Drilling Equipment

LUCEY Export

LUCEY EXPORT CORPORATION

233 BROADWAY, NEW YORK 7, N. Y.

Pretecca, Urbanizacion Sucre, Maracaibo, Venezuela
Calle Defensa 320, Buenos Aires, Argentina
Broad Street House, London E.C.2, England
Rua do Carmo, 8-7°, Rio de Janeiro, Brazil
Calgary and Edmonton, Alberta, Canada
West Building, Houston, Texas



Hydra Hook

another

WEB WILSON

Quality Product

(Details on reverse side)

NOTHING LESS THAN WEB WILSON

Quality...

...IS "GOOD ENOUGH" FOR YOU!

For Rotary Drilling, Setting Casing, or Handling Tubing, the WEB WILSON *HYDRA HOOK is winning unanimous approval.*

Only
Hydra Hook
has all these Quality features

THE OIL CUSHION provides controlled hydraulic spring action; eliminates "bouncing" the tool joint pin in the box; and avoids damage to the threads and sealing shoulders which results in dangerous, expensive "wash-outs."

THE OIL BATH ensures perfect, permanent lubrication, and increases the life of the Main Bearing, Springs and the Plunger by means of the famous Web Wilson "Dash-Pot" action.

NO "LOAD-CARRYING" THREADS in HYDRA HOOKS—another Web Wilson feature of *utmost importance* to you.

NO DANGER OF HANGING-UP in the derrick, because of the ultramodern streamlining and compactness of *HYDRA HOOKS*.

EASY TO "SPOT" PIPE—Spring travel from four inches in *HYDRA HOOKS* for tubing, to ten inches in the 450-Ton "giant" ensures fast alignment and safe thread engagement.

DUST-PROOF BODY—The sealed-off body of all *HYDRA HOOKS* prevents the entry of dust, rain or any foreign matter.

ALL SIZES FALL FAST AND FREE—Even the smallest *HYDRA HOOKS* have plenty of weight to fall fast.

FREE SWIVELLING—Whether loaded or unloaded, all *HYDRA HOOKS* are "free swivelling"—and they stay that way.

MINIMUM OVER-ALL LENGTH provides maximum operating space in the derrick. Length is still less when a *HYDRA HOOK* is "Unitized" or "Direct-Connected" to the travelling block of your selection.

LOCKED AGAINST ROTATION—Simple, protected mechanism locks in eight equally spaced positions; and operates with a simple, downward pull.

STRONG, "FUNCTIONAL" PARTS are efficient, simple, and fewer in number than ever before. Example: the Locking Mechanism to prevent rotation while drilling consists of *only three* parts.

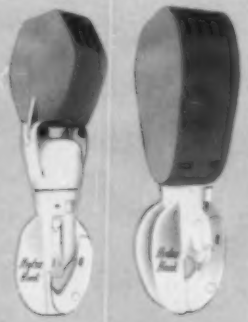
"MAGNAFLUX" INSPECTION—*Each* part of *every HYDRA HOOK* is "Magnafluxed" and given other inspections before assembly. The complete hook is then checked on a test stand to ensure safe, effortless operation.

FEWER PARTS EASY TO OPERATE
EASY TO SERVICE

The minimum number of parts in the *HYDRA HOOK*—far less than in any hook ever before offered—are simple, strong, and functional in design. Operation is therefore safe, fast and easy for the crew; assembly and dis-assembly quickly performed. Example: an experienced crew can change both springs in a *HYDRA HOOK* in *two hours*, right *on the derrick floor*, and *no* special tools are required.

One of these seven sizes will exactly meet your needs...

HYDRA HOOKS **are available for tubing work as well as for the deepest drilling. Rated load-carrying capacities are 40-Ton, 65-Ton, 100-Ton, 150-Ton, 250-Ton, 350-Ton, 450-Ton.**
HYDRA HOOKS **can be "Direct-Connected" to any travelling block. Ask any Web Wilson office or representative for details.**
HYDRA HOOKS **are available "Unitized" with most travelling blocks to form a unit with minimum over-all length as pictured at right.**

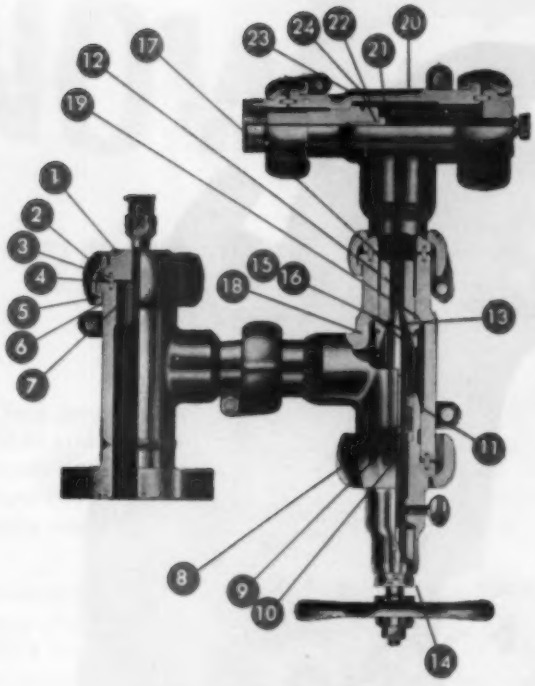


"Direct-Connected" "Unitized"

WEB WILSON

OIL TOOLS, INC. LOS ANGELES • DALLAS • NEW YORK
MAIL ADDRESS: BOX 72096, LOS ANGELES 2, CALIFORNIA

Printed in U. S. A.



Are you getting all of these important features for your flow manifold dollars?

These are the "Extras" that make UNIBOLT the best buy of all manifolds

1	Tee cannot be accidentally opened.	13	Wing Valve requires no grease to effect a seal . . . may also be used as micrometer-gauged flow bean.
2	No exposed threads . . . no accidental damage.	14	Variable choke speeds up initial clean-up or running initial flow tests . . . saves rig time.
3	Concealed seat in groove . . . no accidental damage.	15	Nitride hardened stem and stem seat . . . resists corrosion.
4	All metal seat . . . not affected by high or low temperature.	16	Choice of hard chrome plated or "SA" stainless stems and seats.
5	Lubricators, bottom hole pressure adapters, and valves easily attached to Unibolt connection.	17	Unrestricted 1" opening in Wing Valve will pass 10,000 bbls. of fluid per day with 100 lbs. pressure drop.
6	2"—3000 lb. wp Unibolt 28% stronger than 2"—ser. 900 flange.	18	Wing Valve can be completely overhauled without removal from tree.
7	Unibolt stronger than tubing threads . . . ideal for working trees with welded lift nipple. Tubing threads in tee if desired.	19	Wing Valve stem seat sealed by power threads and metal gasket assures alignment.
8	Stem packing needs no tightening.	20	Positive Choke Body takes regular or "X" Beans . . . all beans flow-rated.
9	Stem turns freely under high pressures.	21	Shaped entrance on beans prevents paraffin clogging.
10	Threads on stem not exposed to external or internal damage.	22	Positive Choke Body may be replaced with inexpensive tee and cage nipple.
11	Full 2½" pilot for true stem alignment and rigidity.	23	Positive Choke Body can be converted to Adjustable Wing Valve by substituting two parts.
12	Streamlined flow — no obstructions . . . no turbulence.	24	Beans and stem seats have external hex for wrenching.

UNIBOLT

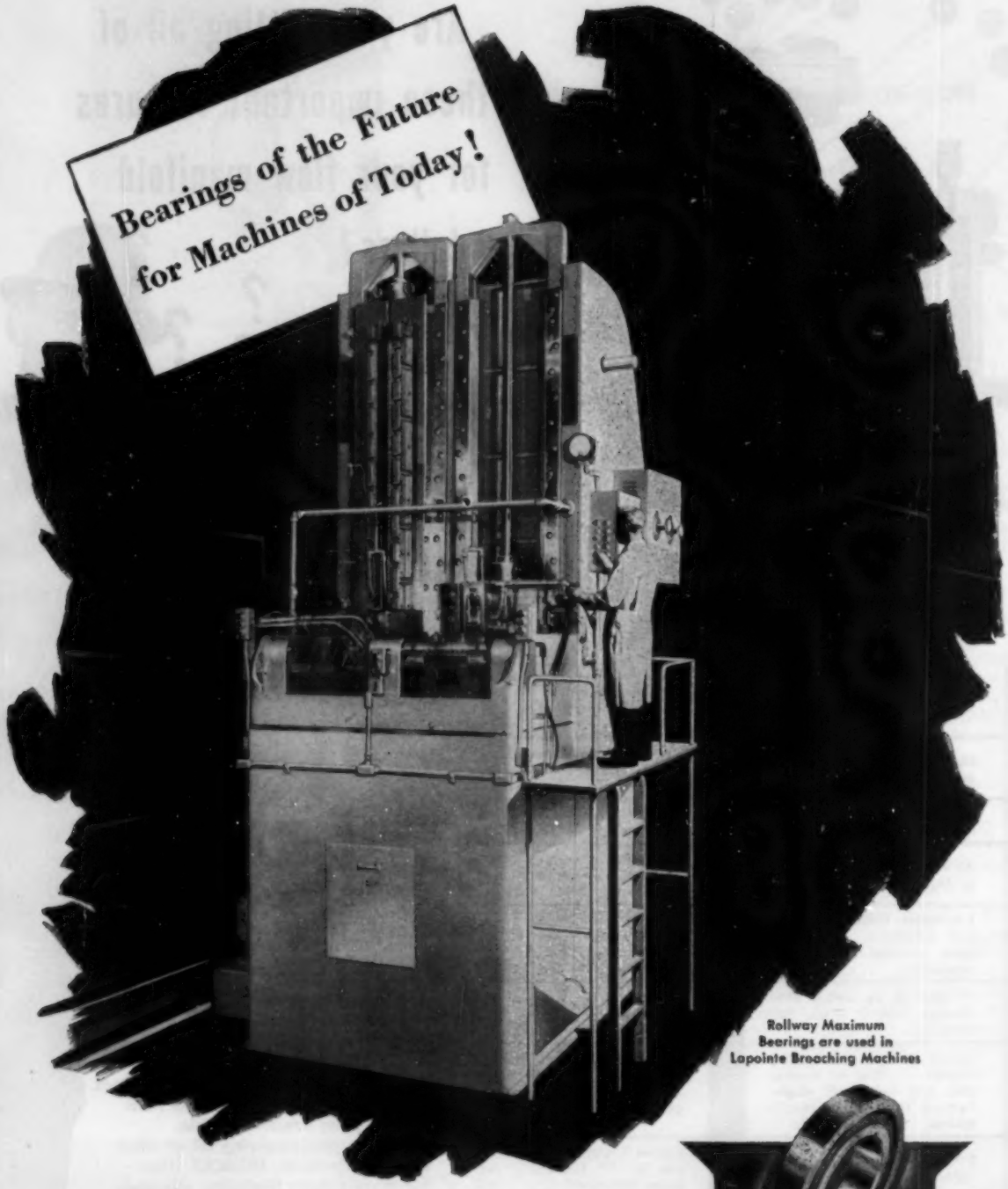
FLOW MANIFOLD

Eliminates impingement of flow and negative pressure areas. It may be salvaged completely or as separate units. The three separate units provide flexibility in arrangement of connections. All parts easily replaced in the field . . . all parts interchangeable. Check the accompanying list of other distinctive features. UNIBOLT offers far more safety, flexibility, efficiency, and all-round quality for your flow manifold dollars.

THORNHILL CRAVER CO.

P. O. BOX 1184
HOUSTON, TEXAS

Bearings of the Future for Machines of Today!



Rollway Maximum Bearings are used in Lapointe Broaching Machines

Rollway roller bearings regularly offer performance capabilities for more than the needs of today. They are continuously anticipating the operating requirements of years ahead.

Wherever bearing precision and load values are important in your plant or products — for original equipment or replacement service — call on Rollway *bearings of the future*, to give you the utmost performance in your machines of today. Rollway Bearing Company, Inc., Syracuse 4, N. Y. Manufacturers of a complete line of radial and thrust cylindrical roller bearings.

ROLLWAY®
Maximum
ROLLER BEARINGS

ENGINEERING OFFICES: Syracuse • Boston • Chicago • Detroit • Toronto • Pittsburgh • Cleveland • Milwaukee • Seattle • Houston • Philadelphia • Los Angeles • San Francisco

NOW . . . you can fill casing from bottom more efficiently than ever!

RECTOR Type "O" Fill Shoe and Fill Collar

Used in conjunction with each other, Rector Type "O" Fill Shoe and Fill Collar provide an automatic constant fill; increase operating flexibility while running casing and during cementing operations. They reduce running time, increase safety, efficiency and economy and minimize the danger of sticking pipe.

RUNNING TIME REDUCED because manual fill is eliminated.

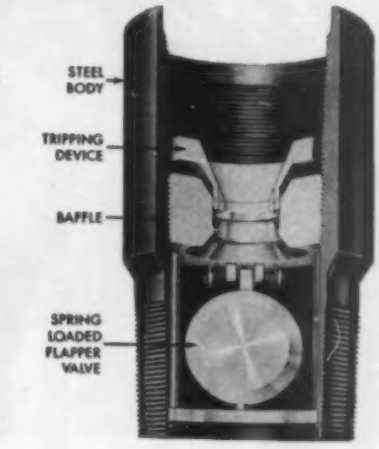
PIPE STICKING MINIMIZED because no "stops" are required to fill from top.

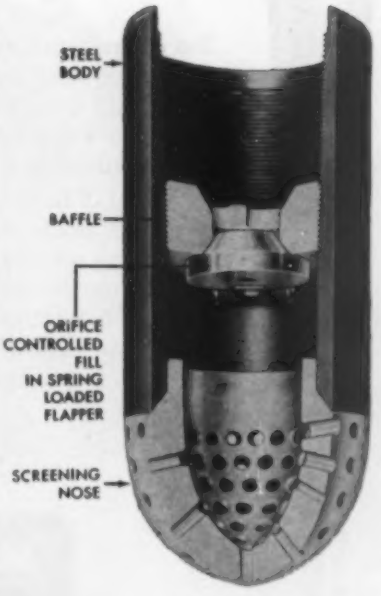
REDUCES PRESSURE SURGE and danger of breaking-down formations, causing lost circulation and loss of drilling fluids.

UNRESTRICTED PASSAGE OF FLUID permits greater volumes through shoe and collar at reduced pump pressures with higher velocity in annulus.

ORIFICE FILL AFTER CIRCULATION. You can stop and circulate as often and long as desired with continued orifice fill when running is resumed.

CONVERTS TO FLOAT WHEN DESIRED, by tripping flapper valve in collar which provides positive closure.





• Internal parts of both shoe and collar are a special aluminum alloy which has greater strength and abrasion resistance, plus easier and faster drill out.

The Type "O" Fill Shoe has a perforated aluminum alloy nose and baffle which is equipped with spring-loaded flapper valve with orifice choke. Orifice inserts are available in various choke diameters engineered for all pipe sizes.

The Type "O" Fill Collar has an aluminum alloy baffle, spring-loaded flapper valve and shear pin assembly for holding valve open. It functions as a back pressure valve or float collar. The flapper valve can be closed at any time by dropping a trip ball in casing at surface. At 650 p.s.i. pump pressure the ball releases flapper valve to provide a positive closure. Ball gravitates, or is pumped into nose of shoe.

If casing is run to total depth with orifice fill, ball is not used. Seating of cement plug on fill collar releases and closes flapper valve which then acts as back pressure valve, providing positive flow-back control.

OUR 25 YEAR

RECTOR WELL EQUIPMENT COMPANY INC

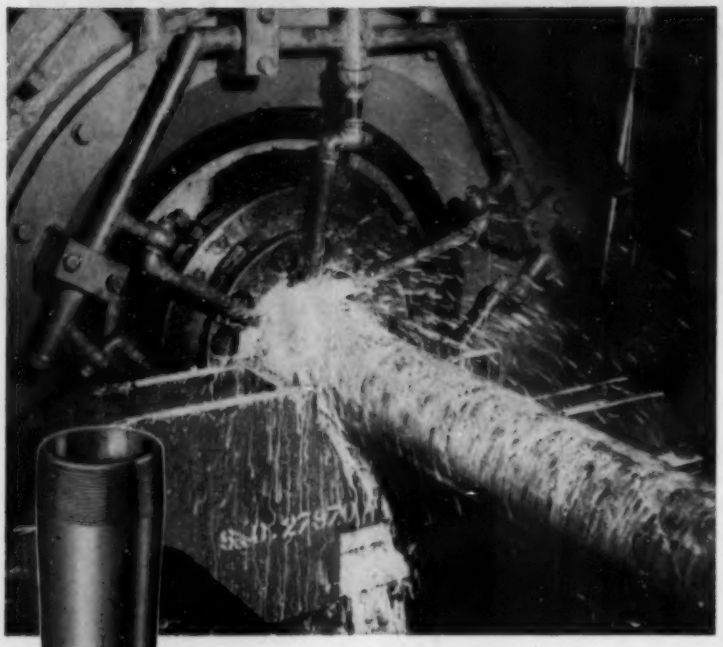
MAKING THE OIL INDUSTRY SAFER

1100 NORTH COMMERCE ST. FORT WORTH, TEXAS

Houston Plant: 2210 Commerce St.

REPRESENTATIVES IN ALL ACTIVE FIELDS

CF&I SEAMLESS CASING AND TUBING



extra care for extra dependability

You can rely on CF&I Seamless Oil Country Casing and Tubing for positive dependability because it's made with extra care—care which exceeds that required by API Specification 5A.

Typical of these extra safeguards is the treatment that's given every steel billet used in the manufacture of CF&I Casing and Tubing. Because experience has shown that tiny flaws sometime lie just below the outer surface of steel billets, CF&I removes ⅛ of an inch of this questionable metal. Giant peelers (lathes) shave each billet down to a solid core...and, with this discarded metal, go flaws which might otherwise go undetected.

This is just one of the extra precautions that CF&I takes to provide you with seamless casing and tubing of the highest quality.

Fully meeting API STD 5A specification, CF&I Oil Country Casing and Tubing are available in sizes from 2⅜" through 9⅝" O.D.

3893

SEAMLESS TUBULAR PRODUCTS

THE COLORADO FUEL AND IRON CORPORATION

Denver, Colorado

CF&I

ANNOUNCING the new SUPER GIANT RIG...

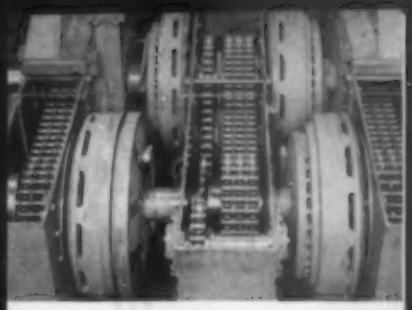
unquestionably...the most advanced and modern rig in the world today

YOU OWE IT TO YOURSELF TO INVESTIGATE THIS NEW AND MODERN RIG BEFORE BUYING

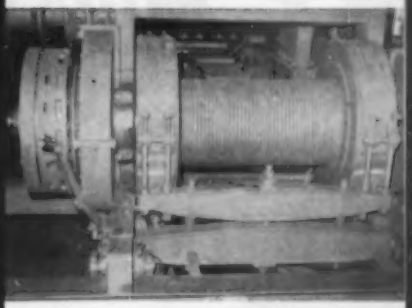
Write for Full Details

WILSON MANUFACTURING CO., INC.

WICHITA FALLS, TEXAS • the home of RED IRON



- *With New Three Speed and Reverse All Friction Clutch Transmission*
- **Available with Parkersburg 22" Single Hydromatic Brake Mounted on Transmission with 6 Speeds Between Drum and Brake — The Best Hydromatic Brake Arrangement Yet Devised!**

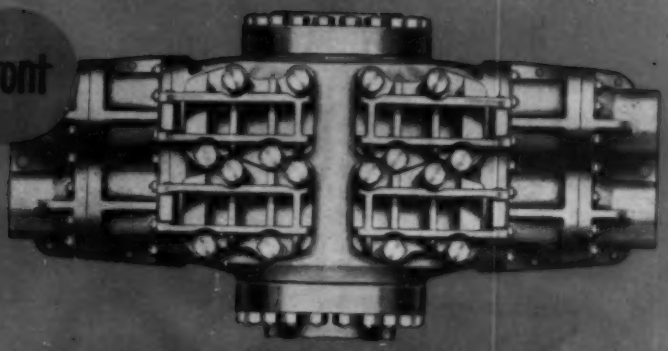


- **With New Beam Equalizer, Single Nut Adjustment Lever Type Brake which CANNOT KICK.**
- **Oil Bath Drum Drive Chains Outside Frame**
- **High and Low Clutches on End of Drum Shaft**
- **Heavy Plate Chain Cases and Covers**

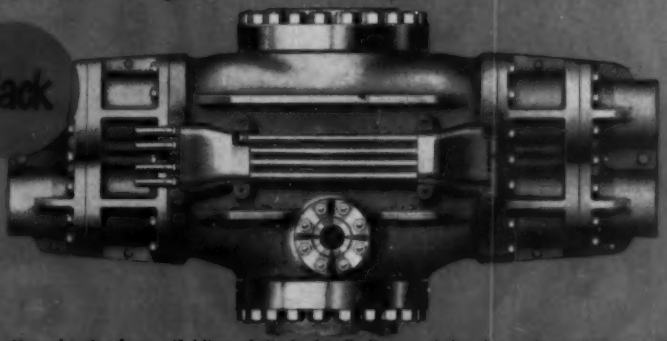
be modern-

buy Wilson

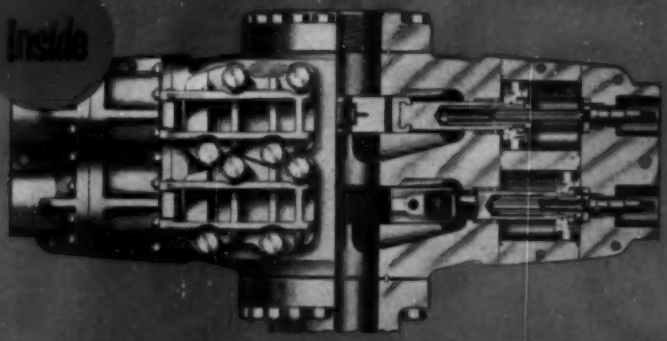
In Cellar Control Gates it's Shaffer FOR EVERY NEED!



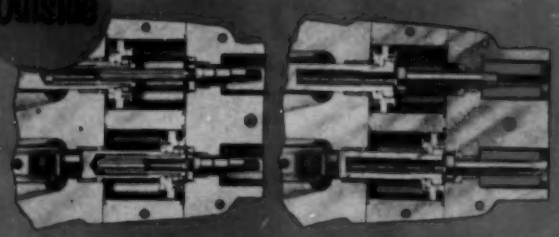
See these conveniently-located doors — a set for each ram compartment! Unbolt and swing them open and you can quickly change rams in either compartment whether the pipe is in or out of the hole. No need to allow extra space above the gate to make ram changes — nor must extra space be provided at the ends of the gate for these changes.



Note the simple manifolding of the hydraulic lines and the clean, clutter-free overall design. Even in sizes as large as 13⅝" (12" Series 900) total height is only 30" for the Double Gate, only 18½" for the Single Gate. Multiple outlets for quickly relieving pressure below each ram can be furnished, if desired.



No mud problems here. Note how the rams travel on high narrow guide ribs above the steeply-sloped compartment bottoms. No detrimental sand or mud can accumulate to interfere with quick, easy ram operation.



Do you prefer the greater compactness of a Non-Rising Locking Shaft (above left)? . . . Or the quick indication of ram position provided by a Rising Shaft (above right)? Take your choice — with Shaffer you can have whichever type you prefer!

And note this!

Shaffer Hydraulic Cellar Control Gates are not only available with a choice of *Non-Rising* or *Rising* Locking Shafts, but with each type you can choose either *Single* or *Double* Gate designs. Double Gates have *two* ram compartments unitized into one body for maximum compactness!

There are no finer Control Gates in the market than SHAFFER — nor any that offer as many unique advantages. So be sure to get complete data on the many exclusive *Shaffer* features before you buy ANY cellar control gate equipment. Your nearby Shaffer representative will gladly supply further details — or write direct!

See the Shaffer Section of your Composite Catalog.

33 years OF OIL TOOL LEADERSHIP

SHAFFER

HIGH PRESSURE DRILLING AND CONTROL EQUIPMENT · FISHING TOOLS THAT EXCEL

SHAFFER TOOL WORKS, Brea, California · California Service Shops: Santa Fe Springs and Taft
HOUSTON, TEXAS, 6006 Navigation Blvd. · ODESSA, TEXAS, 1925 West Second Street
OKLAHOMA CITY, OKLAHOMA, Shaffer Tool Works, 6201 South Shields Boulevard
FARMINGTON, NEW MEXICO, Shaffer Tool Works, Post Office Box 546
CASPER, WYOMING, Shaffer Tool Works, Post Office Box 1788
EXPORT SALES OFFICE: Shaffer Tool Works, 500 Fifth Avenue, New York, N. Y., U. S. A.

Send for your free copy of the latest Shaffer Catalog.

An Important Announcement...

Of Vital Interest To Everyone In The Oil Industry

SUBJECT: SAFETY - of Personnel and Property During Jet Perforating

In The Interest Of The Oil Industry . . .

U. S. Patent No. 2,703,053 *for Foolproof Safety In Jet Perforating*
Now Contributed Without Royalty *by Perforating Guns Atlas Corporation*
To ALL Perforating Companies *Licensed To Use The Jet Process*

JET GUN DANGER

The **conventional** blasting cap used in Jet Perforating Guns has always been a source of danger to life, wells and other property . . . because it requires only about 1/10 of a watt of electrical energy to detonate the cap and thereby accidentally fire the whole gun. This inherent weakness of the **conventional** blasting cap was determined years ago by PGAC engineers when they discovered that such infinitely small amounts of electrical energy could be picked up by the firing circuit from stray currents or from discharges of static electricity around or within the well.

RESEARCH REWARDED

PGAC engineers finally devised a completely new blasting cap assembly, combining a high-resistance element and a fuse in the circuit. PGAC's new cap cannot be detonated until after its fuse is burned away—and the fuse cannot be burned away by other than a **relatively high current.** Such current cannot be picked up accidently by the circuit—but must be introduced **by the simultaneous closing of two electrical circuits** which, in turn, can be accomplished only by two hands simultaneously and intentionally operating two separate switches on the control panel.

INVENTION PATENTED

All features of this new blasting cap assembly and its unique firing circuit have been fully protected by United States Patent No. 2,703,053 granted to the Perforating Guns Atlas Corporation. The new blasting cap assemblies and firing circuits have been exhaustively field-tested for several years and found as foolproof as humanly possible.

A CONTRIBUTION FOR SAFETY

In the interest of **Increased Safety** for the entire Jet Process Perforating Industry, PGAC has made available to **all** present and future licensees having the right to use the Jet Process, the additional right to use this new PGAC invention **without the payment of royalty of any kind.**

USE INVITED

It is sincerely hoped by PGAC that their confreres of the Jet Perforating Industry will avail themselves of this contribution to **the Greater Safety of their personnel and their customers' property.** No other reward could be so gratifying to the men and women of PGAC.

PGAC 566

PERFORATING GUNS ATLAS CORPORATION

Houston, Texas Telephone REpublic 4-1651
General Offices and Main Plant: 7730 Scott Street—Sales Office: Melrose Building

P G A C OIL FIELD SERVICES

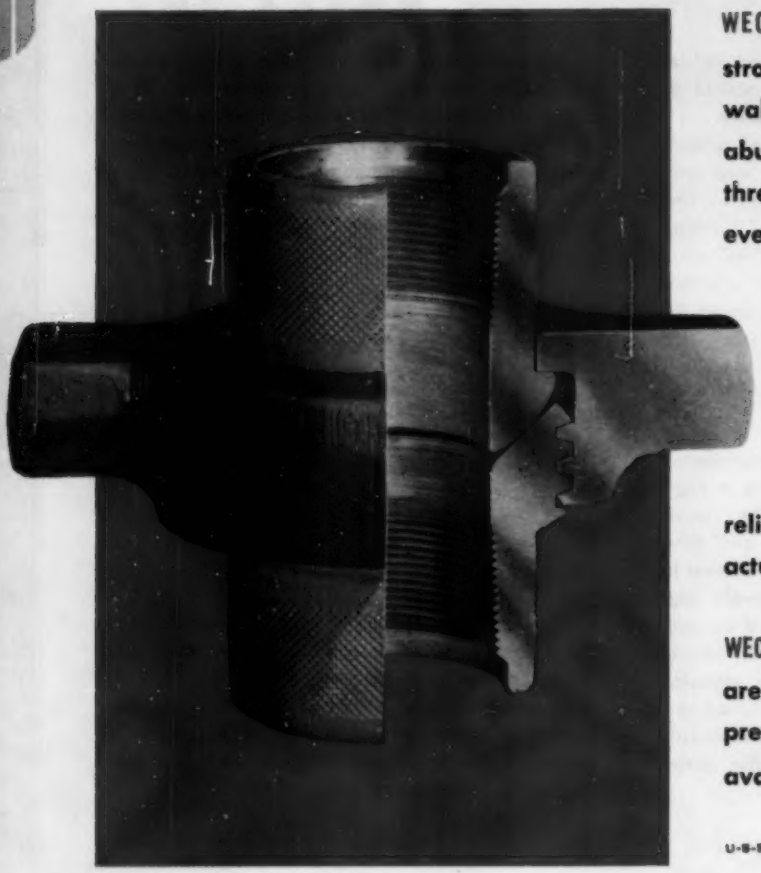
CALL FOR PROMPT SERVICE—ALWAYS READY TO SERVE YOU
TEXAS: Abilene — Alice — Beaumont — Bowie — Colorado City — Corpus Christi — Dallas — Fort Worth — Gainesville Graham — Houston — Longview — Midland — Odessa — Pampa — Tyler — Victoria — Wichita Falls.
OKLAHOMA: Ardmore — Healdton — Oklahoma City — Pauls Valley — Pawhuska — Perry — Seminole — Tulsa.
LOUISIANA: Houma — Lafayette — Lake Charles — Shreveport. KANSAS: Great Bend — Liberal. NEW MEXICO: Hobbs.

AFFILIATE COMPANIES: CANADA—Perforating Guns of Canada, Ltd.; Edmonton, Alberta
GERMANY—Atlas Deutsch- Amerikanische Olfelddienst G. m. b. H.; Kiel VENEZUELA—Servicios Tecnicos Atlas, C.A., Caracas

the three R's

OF SUPERIOR UNION SERVICE

RUGGED
RELIABLE • RIGHT



WECO UNIONS ARE BUILT RUGGED with stronger subs and wing nuts, heavier wall construction to take rough use-and-abuse in the field. Their rugged Acme threads make-up fast and accurately—even after repeated break-out.

WECO UNIONS ARE RELIABLE. Their famous metal-to-metal ball and cone seat gives positive protection against leaks from shock, surge and vibration. Because they provide such reliability, Weco Unions last longer—actually cost less in the long run.

WECO UNIONS ARE RIGHT wherever unions are required. And there's a size and pressure for every requirement. They're available from supply stores everywhere

U-9-56

WECO®

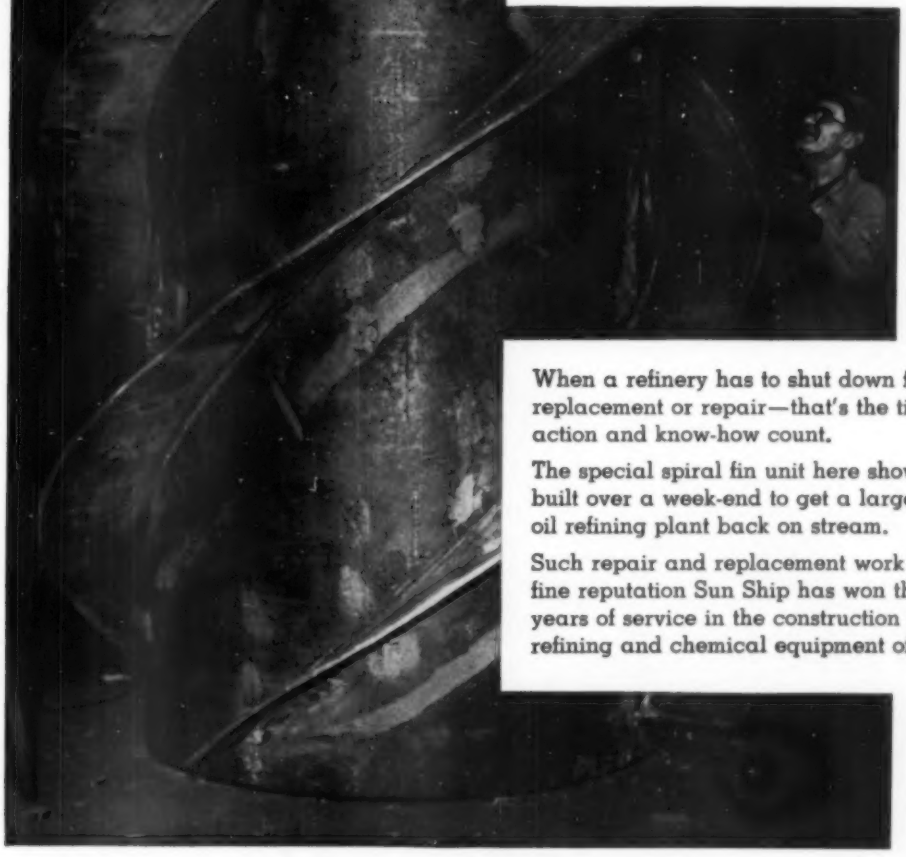
WELL EQUIPMENT MFG. CORP.
HOUSTON, TEXAS

Division of CHIKSAN COMPANY *a subsidiary of*
FOOD MACHINERY AND CHEMICAL CORPORATION

PESA

fmc FOOD MACHINERY AND CHEMICAL CORPORATION

FAST REPLACEMENT



When a refinery has to shut down for a replacement or repair—that's the time when action and know-how count.

The special spiral fin unit here shown had to be built over a week-end to get a large oil refining plant back on stream.

Such repair and replacement work has added to the fine reputation Sun Ship has won through years of service in the construction of oil refining and chemical equipment of every kind.

Sun

SHIPBUILDING & DRY DOCK COMPANY

ON THE DELAWARE SINCE 1916 CHESTER, PA.

J&L can help you with VALVES

We have sold valves for over half a century.

Use this experience! Its practical application by trained J&L men can be valuable to you when problems arise or technical specifications are involved.

In the meantime valves and fittings you need from day to day are in stock at your near-by J&L Store. Good valves, well selected.

Yes, *J&L can help you with valves.*

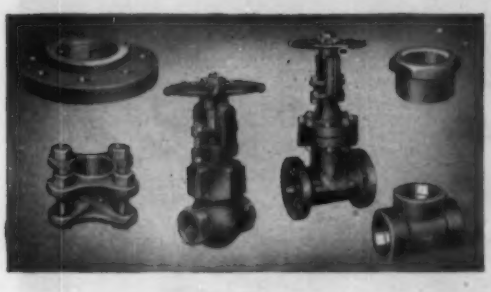
Jones & Laughlin

SUPPLY DIVISION – Tulsa

SERVING THE UNITED STATES AND CANADA

6-G

Designed for today's *Tough* service demands

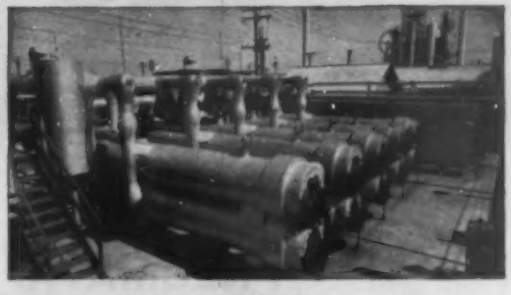


DROP FORGED VALVES AND FITTINGS FOR TOUGHNESS AND TROUBLE-FREE SERVICE

Drop forged from carbon and alloy steels, Vogt valves, fittings and flanges will safely handle liquids and gases at high pressures and high temperatures in power plants, chemical plants, petroleum refineries, etc. The complete line includes flanged, screwed and socket weld end globe, gate and check valves—ells, tees, and crosses—couplings—bushings—plugs—unions—flanges and flange unions—and welding heads.

MODERN STEAM GENERATORS

Vogt steam generators are designed to give maximum rating in a minimum of space, with high efficiency and low maintenance expense. Bent tube types and straight tube, forged steel sectional header types to burn solid, liquid or gaseous fuels meet every power, process or heating requirement.



PROCESS EQUIPMENT FOR EVERY SERVICE

Vogt constructs process equipment in wide variety to all Codes. Stills and towers, oil chillers, crystallizers, heat exchangers, molding machines, etc., serve in the manufacture of oils, greases, 100 octane gasoline, synthetic rubber, chemicals and related products around the world.

SPECIAL MATERIALS COMBAT CORROSION AND PRODUCT CONTAMINATION

Our modern shops produce a wide variety of equipment from special metals and alloys to fight corrosion and product discoloration or contamination. Fabrication procedures insure that corrosion resistant properties of welds will match that of the materials used to construct the equipment.

MORE REFRIGERATION TONNAGE AT LESS COST

More than 70 years of engineering and manufacturing experience is incorporated in Vogt refrigerating and ice making equipment. Absorption Systems, Compression Systems, and Tube-Ice Machines in a wide range of capacities serve industrial and processing plants, and institutions, here and abroad.

Vogt

PRODUCTS

FOR REFINERIES, CHEMICAL PLANTS POWER PLANTS AND PROCESS INDUSTRIES

Write Dept. 24-GPE for catalogs

HENRY VOGT MACHINE CO.
LOUISVILLE 10, KY.

BRANCH OFFICES: New York, Philadelphia, Chicago, Cleveland St. Louis. Dallas, Charleston, W. Va.

A BRAND-NEW CONCEPT IN FLOW TOTALIZING!

. . . THE NEW FOXBORO PNEUMATIC FLYBALL INTEGRATOR

Inherently Accurate!

- Eliminates Inaccurate "Spot Check" Counting!
  Continuous integration assures highest precision.
- Eliminates Cam and Linkage Errors!
  Unique design balances differential pressure signal directly against centrifugal force.
- Eliminates Calculations!
  Automatically extracts square root — shows totals in desired units.
- Eliminates Fire and Explosion Hazards!
  Simple, all-pneumatic operation requires no electric motors, wires, or contacts.

FOXBORO
REG U S PAT OFF

Now you can integrate the flow of all process fluids or plant services *continuously* . . . with new accuracy . . . complete safety! The unique new, all-pneumatic Foxboro Flyball Integrator completely eliminates intermittent counting and fire hazard. Its simple, force-balance operation utilizes the 3-15 psi air signal from any differential-pressure flow transmitter. This signal is *continuously* balanced against the "flyball" force of the instrument's pneumatically-driven turbine. The square root function is automatically extracted . . . you read flow totals *directly*.

The Flyball Integrator mounts at the point of measurement or on a panel hundreds of feet away. Response and accuracy are completely unaffected by ambient temperature changes or pressure changes in turbine air supply. Ideal solution to all plant fluids accounting and in-process inventory checking. Write for complete details. The Foxboro Company, 647 Neponset Ave., Foxboro, Mass.

FIRST IN FLOW

U. S. Rubber announces another major advancement in OIL DOCK HOSE!

NEW U. S. AMAZON H-1818 Lighter Weight Suction & Discharge Hose Speeds Header Make-up, Cuts Dock-Side Time!

TWICE AS FLEXIBLE... visible proof that the new H-1818 (left) —with the same 200 lb. operating pressure rating as conventional hose (right)—is *twice as flexible!* In addition, H-1818 *weighs one-third less* per foot, has *50% lighter ends*, and provides the *greatest hydrostatic values* ever!

GET HOSE SUCTION LINES flowing quicker with this far more flexible, lighter-to-handle hose. The 8" i.d., for instance, has a bending radius of 3 feet, weighs but 18½ lbs. per foot (instead of 30 lbs.) and comes with metal connections weighing only 85½ lbs. (rather than 175 lbs.!)

The new U. S. AMAZON H-1818 Lighter Weight Suction & Discharge Hose provides—

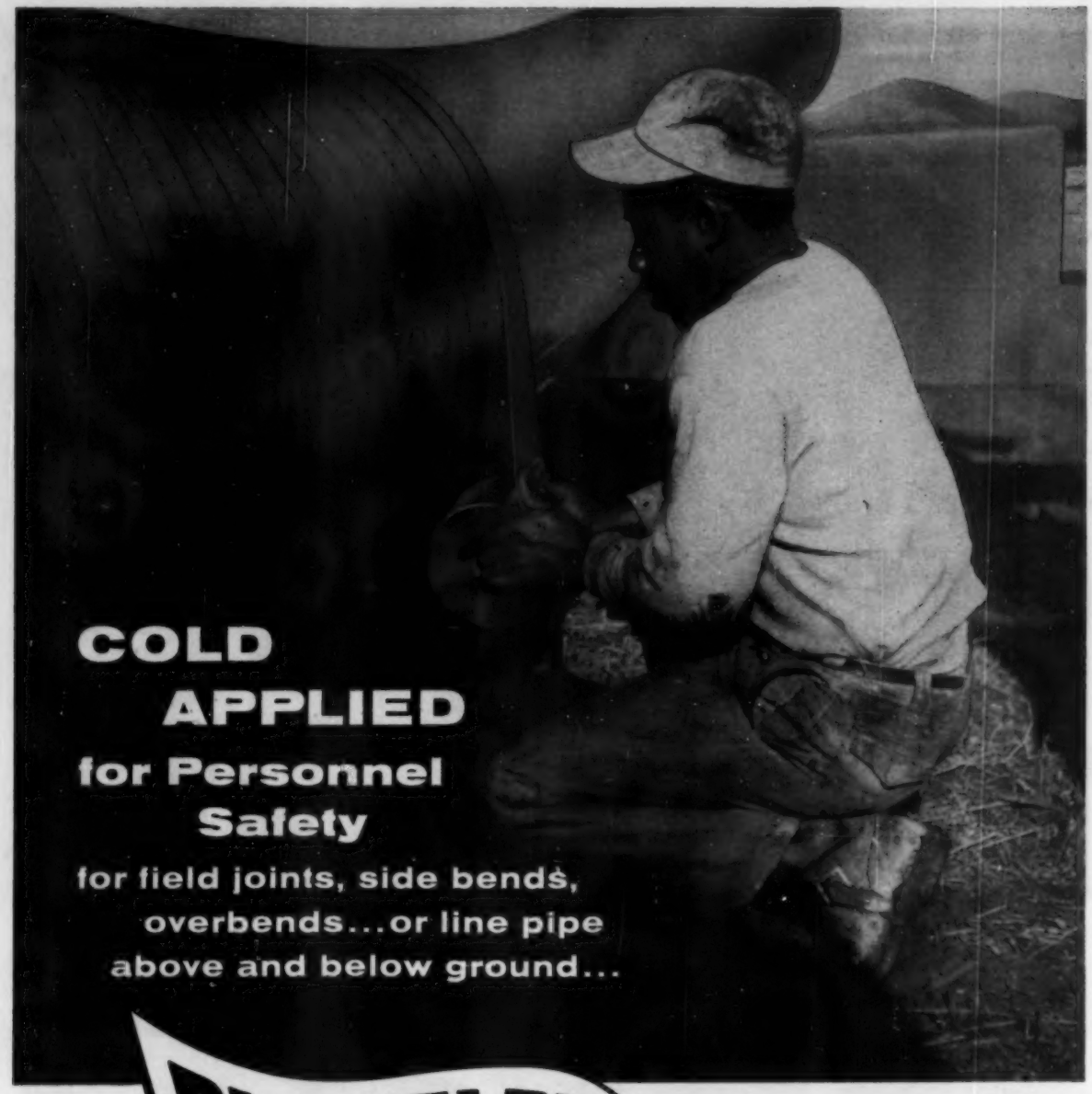
- **Easy Handling—lighter weight and ready flexibility.**
- **Ultimate Hydrostatic Values—up to 75% higher than conventional dock hose.**
- **Greatest Safety—harmless seepage, rather than sudden burst, when hose has served its time.**
- **Positive Static Connection Through Body Wires—eliminates possibility of static bond failure.**
- **Highest Crush Resistance—with greatest flexibility.**
- **Smooth or Corrugated Covers—smooth for repeated rough moving; corrugated for more permanent installations.**
- **Lightweight Steel Nipples—with forged aluminum, bronze, steel, or cast iron flanges—as ordered.**

U. S. Amazon H-1818 is obtainable through any of our 27 District Sales Offices or write to us at Rockefeller Center, New York 20, New York.

US RUBBER

Mechanical Goods Division

United States Rubber

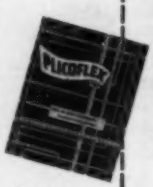


rely on PLICOFLEX Laminated Pipeline Tapes

TRADE MARK

Get rid of hot pots and pouring buckets, throw away torches and gas bottles, eliminate the hazard of injuries from burns and noxious fumes!

You can, for Plicoflex No. 340 Laminated Tape is *cold-applied*—by hand or machine. It may be used with any existing yard-applied pipe enamel. The largest pipe can be wrapped quickly by two unskilled men at most... usually by only one.



Write for this new, free bulletin.
It tells the whole Plicoflex story.

SURE AS WELL AS SAFE!

Laminated of tough stable polyvinyl chloride film and compounded butyl rubber, Plicoflex No. 340 Tape offers greater protection than other tapes... more-than-double thickness, extra resiliency. Permanent, inseparable bond to pipe and sealed overlap to prevent moisture migration are just two more of many Plicoflex features.

PLICOFLEX, INC.

1566 EAST SLAUSON AVENUE
LOS ANGELES 11, CALIFORNIA • LOGAN 8-4335

Trademark for DRYers for instrument air, materials being processed and in storage

YOU SEE dehumidifiers bearing this familiar nameplate—Lectrodryer*—in thousands of plants all over the world, in almost every industry. Ever since 1932, they have been helping to speed output and maintain high product quality by removing unwanted moisture to uniformly low dewpoints.

LECTRODRYER is the name of a large family of DRYing machines. They DRY air, gases and organic liquids. They range in size from the tiny Laboratory model, capable of handling a few cubic feet per hour, to giant wind tunnel installations DRYing tons of air per minute. They work from atmospheric pressure to as high as 6,000 psi.

Twenty-three years of DRYing experience is yours, when you consult with Lectrodryer engineers. Recommendations on plant layout, controls and other auxiliary equipment are all co-ordinated with the type and size of Lectrodryer prescribed for the job. You save time and money, and are assured of most efficient operation.

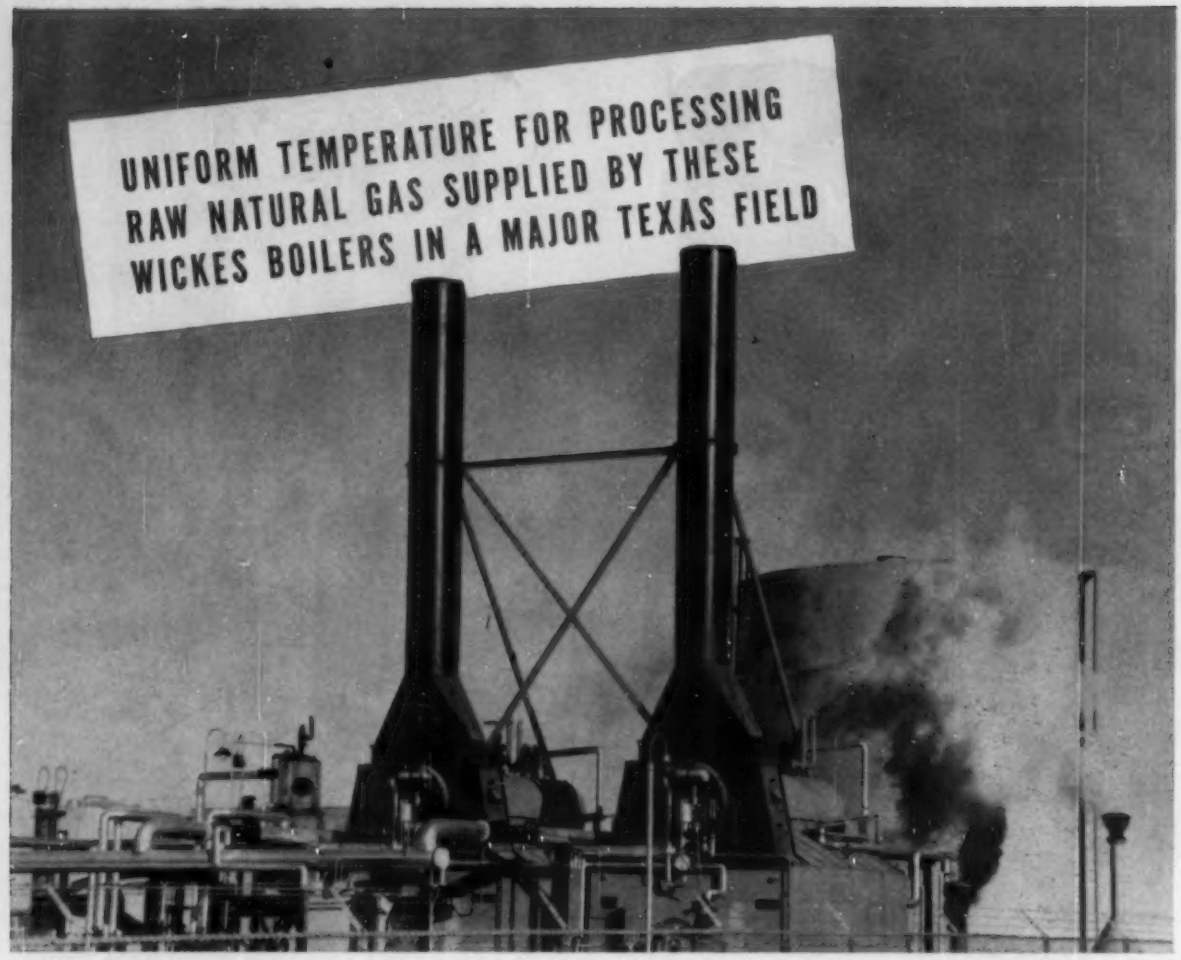
Remember the word LECTRODRYER when you need DRYing help. For a free copy of the book, *Because Moisture Isn't Pink*, write Pittsburgh Lectrodryer Company, 334 32nd Street, Pittsburgh 30, Pa. (a McGraw Electric Company Division).

In England: Birlec, Limited, Tyburn Road, Erdington, Birmingham.
In France: Stein et Roubaix, 24 Rue Erlanger, Paris XVI.
In Belgium: S. A. Belge Stein et Roubaix, 320 Rue du Moulin, Bressoux-Liege.

LECTRODRYERS DRY
WITH ACTIVATED ALUMINAS

LECTRODRYER

* REGISTERED TRADEMARK U. S. PAT. OFF.



162

Recently installed in the Texas field of a major petroleum producer, these two Wickes boilers assure delivery of the steam at proper uniform temperature and pressure to separate liquids and undesirable components. Wickes boilers are often chosen by petroleum companies, not only for field processing operations, but also for a dependable source of steam in refineries. The units shown here are Wickes Type A-2 shop-assembled water tube boilers, each with a design pressure of 275 psi and an operating pressure of 260 psi.

Other Wickes Type-A shop-assembled boilers are engineered for pressures up to 1,000 psi and steam temperatures up to 750°F., with sustained steam production up to 60,000 lbs. per hour. They are protected by pressure-tight steel casings which are completely weatherproof for outdoor installation. Throughout the petroleum industry, Wickes boilers are providing dependable, low-cost steam generation . . . for further information on Wickes units, consult your nearest Wickes representative or write for full facts.

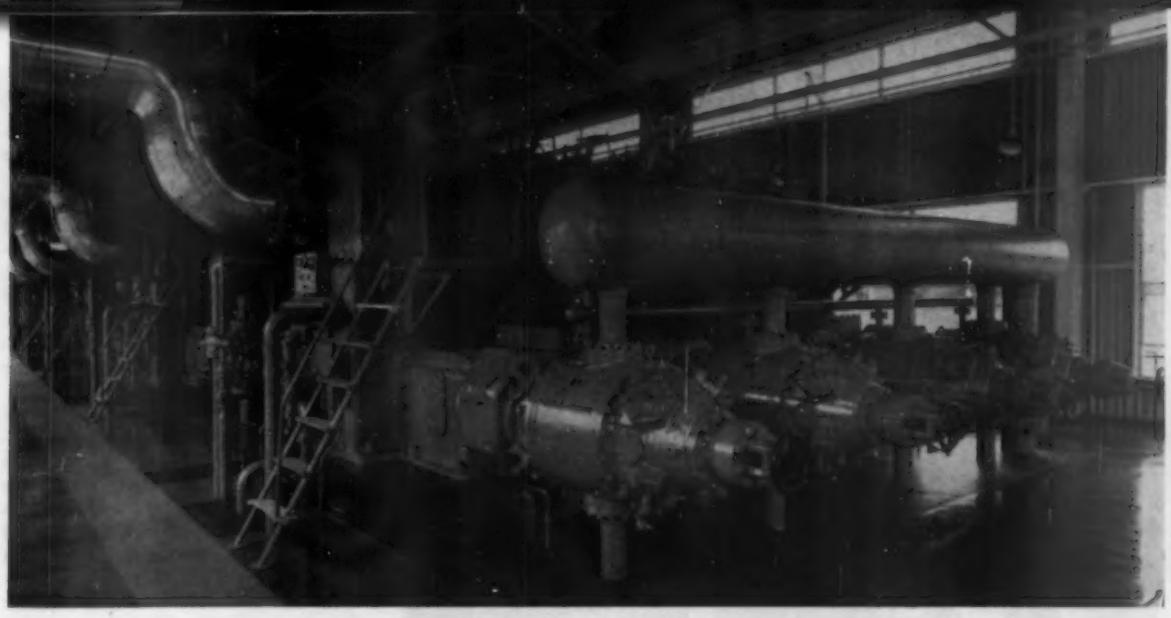
WRITE TODAY FOR
OUR NEW BULLETINS
NO. 56-1 WICKES TYPE-A
STEAM GENERATORS
NO. 55-2 WICKES TYPE-S
STEAM GENERATORS
WE WILL ALSO SEND YOU
OUR COMPLETE FACILITIES
BULLETIN NO. 55-1

WICKES

THE WICKES BOILER CO.

DIVISION OF THE WICKES CORPORATION • SAGINAW, MICHIGAN

RECOGNIZED QUALITY SINCE 1854 • *SALES OFFICES:* Albuquerque, N. M. • Boston • Buffalo • Charlotte, N. C. • Chicago • Cleveland • Dallas • Denver • Detroit • Fort Wayne, Ind. • Houston • Indianapolis • Los Angeles • Memphis • Milwaukee • New York City • Portland, Ore. • Saginaw • Salt Lake City • San Francisco • Springfield, Ill. • Tulsa • Washington, D. C.



Compressor batteries are among the heaviest, most expensive of all units in petrochemical, refinery and gasoline plants.

P. 701.

Increasing in Numbers, Complexity

REFINERS' 'Tools of The Trade'

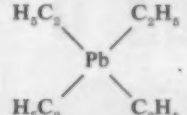
Arch L. Foster

SPECIALIZATION is the key-word for oil refining and its satellite industries. People, processes, products, all are directed more and more closely to fill the specific needs, the demands for any individual role, routine or consumer purpose. In the same vein the matériel, prive movers and catalysts are designed for and applied to a distinctive job. Long gone is the day when the same pump could be employed as a crude charge pump, thermal cracker hot oil pump, or to throw waste water out of the low spots in the plant yard. Each unit is developed to meet a specialized requirement, and nothing else will do as well for that job.

Result is that the quantity of material in the refinery has increased many fold over the amounts used 30 years ago. Not only is the sum total tonnage of steel, etc., many times that found in refineries in the Wild '20's, but the making of them and designing for specific operations have grown in complexity even more than have the operations themselves. No change in the direction of the trend is discernible for the foreseeable future.

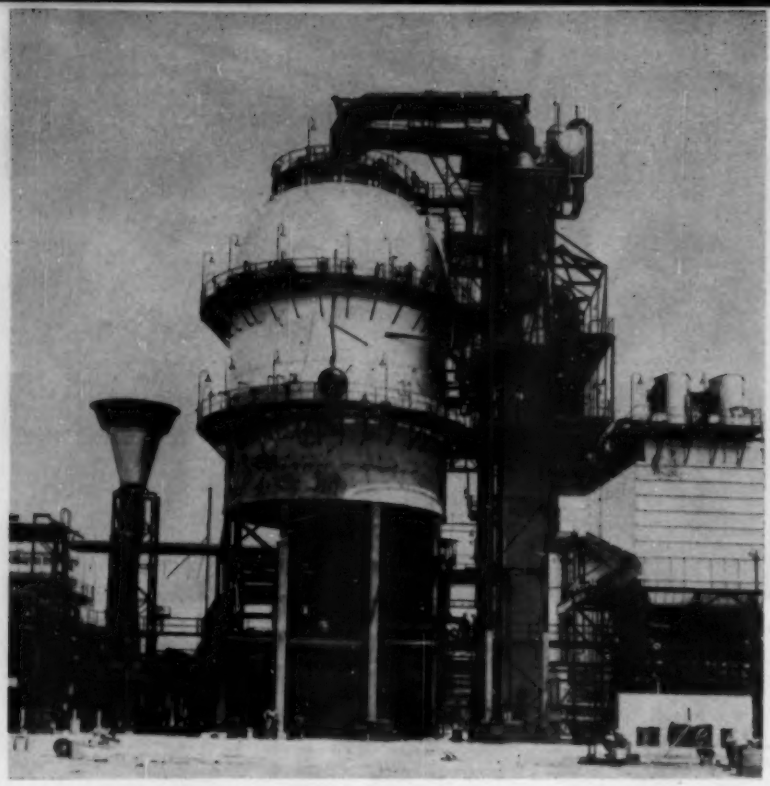
Major cause of this increasing complexity in both process and equipment required to operate them may be traced, with a few variations, to one great movement that overshadows the entire industry — the mushroom growth of catalysis and the use of catalysts in the industry, for a rapidly increasing number of processes. And again, with a few exceptions, the use of the reactions of catalysts has been forced on the industry for one reason — the competitive pressure to raise the qualities of products refined for the trade, of which the one looming largest on the horizon is motor fuel.

After the initial step in making the crude gasoline of the turn of the century, namely simple non-fractionating distillation, the next step in the improvement of this product was simple chemical treating to remove undesirables, calling for acid-resistant steels or other metals in uncomplicated units of vessels, piping, pumps, etc. Then the automotive engineers discovered detonation and the Octane Race was on. Finding that too many of the hydrocarbons in petroleum failed to permit raising engine efficiency in the very early 1920's "Boss Ket" Kettering, Tom Midgley, and Tad Boyd began to make alchemy and the product was tetraethyl lead, a queer "morganatic marriage" between a metal molecule and four residues or radicals from a hydrocarbon, ethane, to give a molecule that the chemist writes in this manner, among other ways:



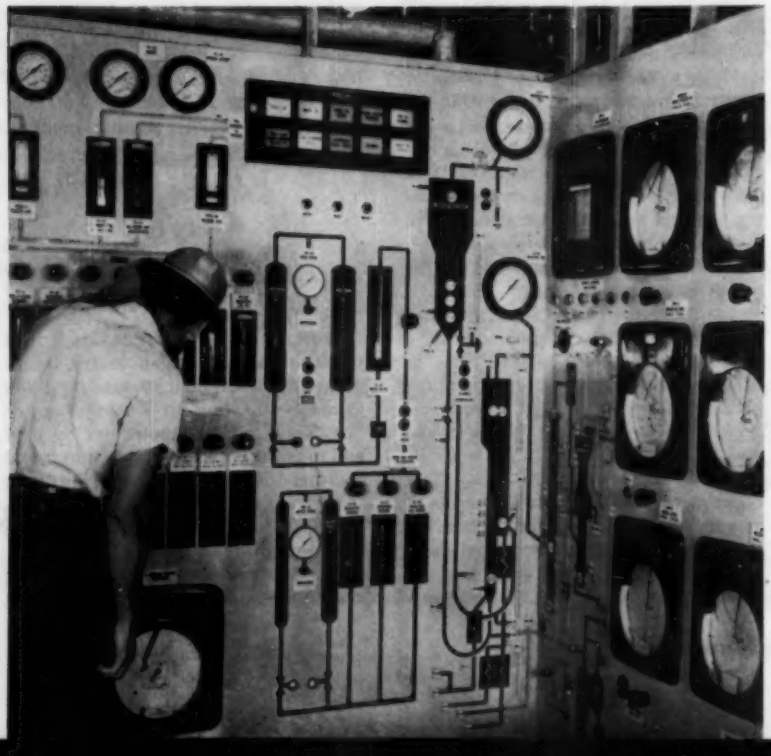
(Pb = Lead metal)

During the very same period a host of experimenters began to try to increase the total yield of gasoline from crude by breaking up, decomposing or "cracking" heavier molecules by heat and pressure applied to the material, and thermal cracking came into being about the same time as TEL, tetraethyl lead. It was largely coincidental that these pioneers, Burton, Dubbs, Cross, Jenkins and many others discovered that cracked gasoline showed less knock-



Twenty Million Dollars went into the building of this West Coast cat cracker.

Instruments, graphic panels and the control room assemblies are the "nerve center" of the modern industrial plant.



ing tendency than did virgin naphtha from the same source. But the Race gained momentum.

Life became less simple for the refiner; legend has it that carelessness, and inattention to his job by an early Pennsylvania stillman, who spent too much time in the "pub" nearby his simple cheesebox still, caused the heat to run too high and crack some heavy oil to gasoline boiling range, so to show the way to cracked gasoline.

Thermal cracking raised a legion of refining problems, chemical and mechanical. The carbon steel shell stills of the day would not hold the pressure generated by 700-1000 F inside; alloys came into use slowly. Carbon burned onto the shell, made hot spots that failed finally, sometimes killing workmen, and generally wrecking adjacent installations. The tube still evolved and, although the steels gave way now and then and let a stream of hot oil into the firebox, great progress was made. Recycling was introduced, needing and bringing hot oil pumps, those ponderous, slow-speed masses of alloy steel, special valves, pistons and rods that sent the inadequately cracked oil back through the coils; coking came into the process picture and another system innovation was necessary to help the refiner run his charge stock, originally gas oil, to "extinction," that is, to gasoline, coke and gas. During this period one of the mightiest of mechanical achievements was the forging, by the German Krupp interests, of the huge 3½-to-5-in. walled soaking drums employed with the old Cross stills. Along with all these developments we saw the passing of pure manual control of processes, and the beginning of the almost automatic operating controls of today.

World War II, with a few warning flashes immediately before, ushered in the Golden Age of Catalysis for the refining industry. The postwar period has brought the Octane Race to white heat, and with and for it the introduction of a large number of catalytic processes, the major units of which are:

Catalytic Cracking
Catalytic Alkylation
Hydrogenation
Catalytic Treating
Catalytic Reforming
Catalytic Polymerization
Hydroforming

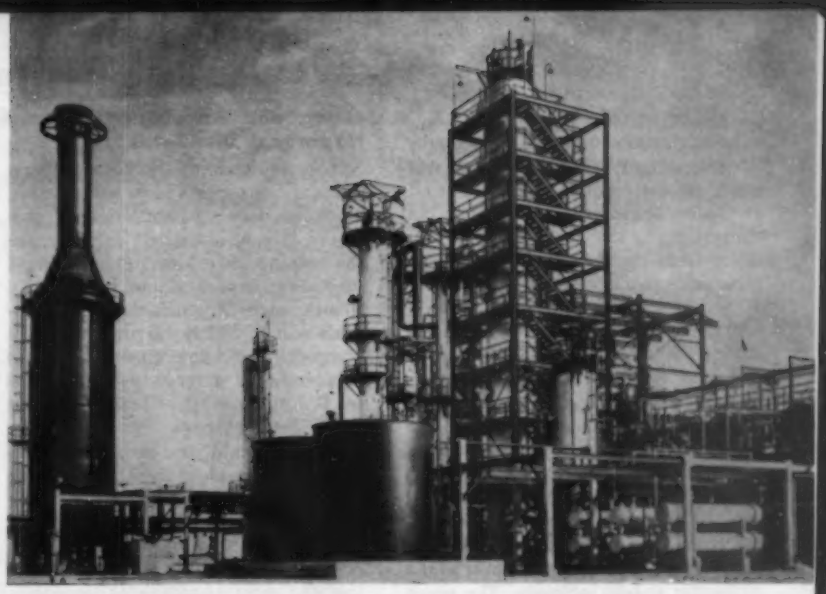
All these processes are means by which the refiner may meet competition in quality, mainly octane ratings. In all of them catalysts are employed to produce more gasoline of higher antiknock rating. The quantities of refining catalysts bought annually reach celestial amounts, a fact not hard to comprehend when it is realized that

each cat unit, especially cracking, has several hundred tons of catalyst in the system continuously. With the best operation practicable each unit loses, either direct to the atmosphere or by discarding as "worn out" or for rejuvenation by the catalyst manufacturer, several tons daily, making the replacement quantity for the industry overall an amount that keeps several cat makers very busy. Several new catalyst factories have been built in recent years in this country and abroad to meet the pyramiding demand.

These catalyst units have changed the skyline of the refinery to resemble, imaginatively, something like that of a great city; the 200-ft towers, earlier ones up to about 250 ft. The multiplicity of piping, pumps, valves, vessels, waste heat boilers, blowers and fractionators give the impression of complexity not belied by the facts. The wartime units were mechanical monstrosities, later experience has shown, consuming unthinkable quantities of steel at a time when steel was one of the two lifelines of the Western World; the other was petroleum. But this situation arose from the fact that these units were projected literally from the test tube to the great commercial stage with little if any of the intermediate experimental work normally employed in bringing a new process to large-scale operation. Even the most recent units are huge masses of metal, each part designed to do a specific job extremely well and efficiently.

These processes and the matériel that make them possible enabled the fuel refiner to reach higher octane ratings with lower losses and higher yields than was possible with purely thermal methods. High levels of business activity and of money in the hands of buyers during postwar years, the competition among automotive manufacturers for sales and their boosting of the octane demands on postwar high horsepower, high compression ratio engines, all these effects have sent the refiner into the greatest period of competition in the industry's history.

Consequently, since the turn of the mid-century refiners have embarked, largely forced by market competition, on a building program the likes of which has not been seen even during the thermal cracking buildup. To illustrate, in 1951 catalytic cracking which in survey figures also included most or all the then existing cat reforming, totalled 1,887,000 B/D, considerably below thermal cracking capacity of 2,332,000 B/D that year. By 1955 cat cracking had passed thermal operations, grown to 3,280,000 B/D, while reforming had mushroomed to 571,000 B/D, with thermal cracking expanding only to 2,447,000 B/D; meantime crude capacity had grown from 7 to 8,500,000 B/D. By January 1, 1956, cat cracking capacity topped 3,700,000 B/D, cat reforming had grown up, totalling 927,000 B/D, crude capacity was starting at 9,000,000 B/D. New figures for hydrogenation — which term covers a multitude of different operations — were reported more than 430,000 B/D, alkylation showed a lusty 254,000 B/D while polymerization was up from 126,000 to 141,000 B/D, a climb of only 11 per cent, about the same that alkylation had jumped during the year. An indication of the trend to the various hydrogenation processes is shown by the climb from 117,000 B/D in 1955 to 433,000 B/D this year, a rise of 275 per cent.



A recent application of an old principle, the selective solvent extraction of distillates to produce much better diesel fuels, etc. A furfural extraction unit.

The significant factor for our thinking here is that each of these processes requires an entirely new unit — barring possibility of using some old equipment such as heat exchangers, etc. Catalytic crackers call for tremendous amounts of steel and a great deal of fabrication as well as great stocks of catalyst, with daily catalyst losses ranging from ¼ to 1 per cent of that circulated, a large replacement figure in the total. Catalytic reforming loses little catalyst, but the catalyst in most processes is expensive, as platinum in millions of dollars value, and when regeneration is required the catalyst from non-regenerative units must be returned to the catalyst manufacturer and be replaced by new material, a relatively expensive procedure.

The above statement is saying merely that as specialization increases the investment in refining capacity, the demand for matériel increases in possibly even greater degree. Not only does the consumption of materials increase in tonnage but the qualities and specifications are boosted by the specialized needs of the new processes. For example, severe corrosion has occurred in widespread manner in cat reforming units, the correction of which has led to the installation of more expensive alloy steels, the use of neutralizing chemicals and other routines to eliminate or minimize this trouble. An outstanding desulfurizing process, cat reforming releases hydrogen sulfide which in turn corrodes vapor lines, condenser and heat exchanger tubes and valve and pump parts unless guarded against by alloys, chemicals or both.

Erosion is a greater evil in cat cracking than is corrosion in most cases, according to reports, largely in moving-bed and fluid bed reactors, regenerators, and transfer lines; pumps handling recycle stock-cat slurry also must be built of erosion-resistant materials to give a satisfactorily long life.

Alkylation is carried out almost entirely with the aid of two corrosive acids as catalysts, concentrated sulfuric and concentrated hydrofluoric. Defense requirements point to our need of adequate alkylation capacity to supply needed amounts of aviation fuel for reciprocating engines. Lacking aviation fuel demand to take up the capacity the industry has built to meet the demands of the Defense Department, in peace time, refiners are converting their alkylation units to make high octane number blending product to include in motor fuel. It is a difficult question to answer, whether the availability of alkylation capacity and its very high -92 -97 range — octane rating production has boosted the octane race and the motor fuel rating or if the inevitable octane race has forced the use of alky-

lation units to make "octanes."

Isomerization falls into the same category, octane-numberwise. Time was when natural gasoline could sell itself to refiners because of the boost to octane ratings as well as volatility that resulted from blending in refinery motor fuels; not so for octane rating. The lowest boiling product in natural and in refinery recovery gasoline, butane shows around 75 octane rating for the normal molecule, up in the 90's for isobutane. Since normal butane predominates in most products, it must be upgraded to serve the blender in anti-knock rating; it also is isomerized to go as an intermediate in alkylation in either process, the latter the more important outlet.

Octane ratings of normal hydrocarbons, from pentane up, are lower as the molecular weight increases. The result is the development of isomerization processes, the Isomate process; Penex, Pentafining and possibly other methods. Pentafining uses a platinum-on-alumina-silica catalyst. Shell's process uses hydrogen chloride, and anhydrous aluminum chloride in butane and/or pentane. Penex, with or without conjunction with Platforming, presumably uses a platinum-containing catalyst on pentane and hexane, in each case requiring a fractionator separation unit to remove existing isoparaffins from the normal stock to be upgraded. Hexanes are also treated in the other processes after separating existing isomers from the normal fraction, thus calling for a separate fractionation unit.

Polymerization processes have been with us a long time, since the middle 1930's, and will continue to operate. Competition here is fierce between olefins for alkylation charge, polymerization charge and petrochemical intermediates; the petrochemical phase will complicate matters more as propylene comes into its own as a poly-product intermediate, since many refiners use propylene in non-selective polymerization for greater yields of motor fuel-destined polymer. Again, each process requires a separate unit, in much of which the equipment is expensive, adding to the refiners' investments and to the total cost of the up-graded product.

In fact, much of the added cost for higher octane ratings comes from the seriously higher investment costs incidental to the multiplicity of units called for in present-day refining. Recently the costs of adding octane numbers was reported as one-eighth cent per number, between 82 and 90 ratings; and on up to ½ cent for the 97-to-98 raise. Refinery gasoline prices must reflect this cost rise and the difference in price must meet the cost margin. "Only the ultimate consumer can pay the costs."

Fining and Forming Naphthas, Distillates

To complicate the refiner's problem of choice of process to fit best his situation, we have a whole family of processes, largely or entirely catalytic, for the refining, or reforming, and always upgrading naphthas and heavier distillates, each of which requires a separate unit of widely varying degrees of complexity and investment cost. Hydroforming is a relatively old —prior to World War II — process using fixed catalyst beds, recently converted to fluid bed design — using a molybdic oxide-aluminum oxide catalyst and hydrogen or hydrogen-rich gas to reform and desulfurize naphthas to almost sulfur-free, high octane number gasoline. During the last war great quantities of aromatics, benzene, toluene, etc., were obtained at a most critical time by efficient fractionation of hydroformate in a number of plants. Then came Unifining for purifying naphthas and heavier distillates by removal of sulfur, nitrogen and other impurities, employing a cobalt-molybdenum type catalyst at 500-750 F, 300 psig or up. This process is very useful, refiners say, for making better kerosines and burning oils, stove oil and diesel fuel, etc. Hydrofining is used to eliminate sulfur, etc., from cat cracker stocks and from various distillates from cracked naphtha up, uses cobalt and molybdenum oxides and sometimes other metal oxides as catalysts. The Husky Refining Diesulforming is a catalytic process for reducing sulfur, oxygen and nitrogen from diesel distillates. Another desulfurization process is Autofining — developed by British Petroleum Co. — for improving also the octane rating of fuels, as much as 25-30 octane number boost being obtained, it is claimed; this uses also the cobalt-molybdenum oxides on alumina catalyst, which is regenerated in situ.

Solvent Refining, Coking

Other units that are used in refining, and bid fair to increase in total capacity are solvent extraction of distillates to yield upper grade furnace oils, diesel fuels and that call for separate units. Furfural solvent is used to make diesel fuels of greatly improved cetane number and burning properties. This process requires the usual contact towers, separator drums or rundown tanks; product stripping stills and solvent recovery stills, rather complicated units. The price differential to enable the refiner to justify the added costs must be considerable; costs run high, especially initial investment in equipment and catalyst stocks.

Cracking heavy oil to the ultimate recovery of liquid product employs various designs of coking processes, delayed, fluid whereby the charge is recycled "to extinction giving products of gasoline, distillates and coke, with normally little if any middle distillate, that is, liquid heavier than gasoline but still fluid; this fraction is normally the recycle stock. The coking unit yields somewhat more gasoline but its chief advantage is more catalytic cracking stock to boost the ultimate motor fuel yield. Investment cost for equipment and installation is again high for these units, though probably less so than for equivalent capacities of catalytic cracking.

Lubricating Oils

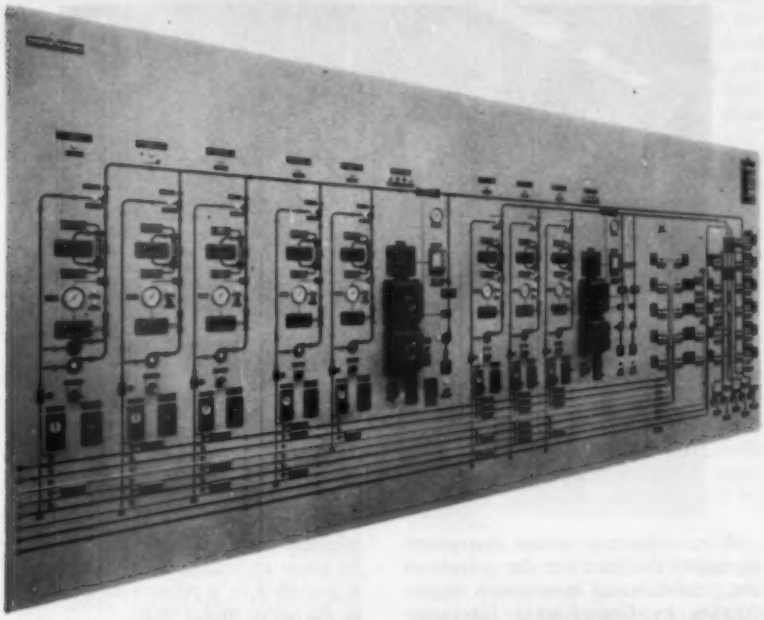
The lubricating oil industry is an old one and its processes are well developed, well known. As are most refining processes, such units are expensive, but maintenance of most of them is relatively low in cost and their useful life span is relatively long. Little that is new has been adopted by the industry of late. Some indications point to a lowered lube oil consumption, as well as production in this country. The improvement in engines that extends the life of the lubricant is one factor; improvement in lubricant quality that further extends its useful life is another large factor. Our markets abroad are being taken gradually by foreign refining capacity that has built up so strongly in postwar years. All in all refiners do not expect much expansion in lubricating oil output. One great growth which involves huge sums of money but little capacity building in refineries is the amazing increase in the use of addition agents in lubricating oils. This means merely that expansion has transferred to the chemical plants rather than refineries; petrochemical plants are an important portion of this widening field.

Thermal Cracker Not Extinct

For a time proponents of catalytic cracking believed that the thermal cracking process was on its way out; this concept is fading; refiners, many of them at least, find that this crude "crushing hammer" type of routine is the most useful known method for disposing of waste fractions, refractory residues in a profitable manner, without the necessity for hunting out or developing a special use for them. Operating methods may change to fit new stocks or new demands for different products, but the hammer-and-anvil thermal cracking process appears to have a new lease on life and to continue to serve a useful, indispensable purpose in the refinery assembly of processes. ★ ★ ★

(136) New Graphic Panels First in Gasoline and Fuel Oil Blending

Proportioneers, Inc., division of B-I-F Industries, announces a new development in its line of panel blenders for stream blending of gasolines, distillate fuels, or lubricants. For the first time, a graphic panel, with the actual control devices built into the flow diagram, gives the single operator a complete and clear picture of the blending operation.



In this new blender, the percentage of the different hydrocarbon components, dyes, inhibitors or other additives, and tetraethyl lead in the finished blend is established through the settings of selector dials and switches on the face of the panel. The unit is claimed to produce precisely controlled blends of finished specification gasolines or fuel oils to interim storage or directly to a marine terminal as long as desired by the operator or up to a predetermined batch amount. Any predetermined difference between the actual flow of any component and the percentage set on the panel automatically takes the unit off the line and each component is recirculated within its own control loop. At the same time, the panel lights indicate which component has failed and where the operator should look to correct the error. As soon as the difficulty (pump failure, plugged strainer, loss of pump suction, etc.) is corrected, the unit goes back "on stream."

Two graphic panel blenders were recently delivered to the new Tidewater Refinery in Delaware City, Delaware. The first unit is for producing jet fuels and distillates at rates up to 7000 gpm. The second unit is for House Brand Premium and aviation gasolines at a similar rate.

Proportioneers, Inc., division of B-I-F Industries, Inc.

(138) New Pneumatic Transmitter for Temperature-Pressure

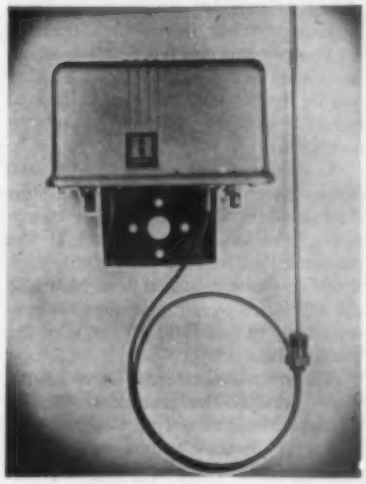
The Minneapolis-Honeywell Tel-O-Set transmitter is a force-balance instrument which, with only minor changes, will measure either temperature, gage pressure, or absolute pressure and produce a proportionate pneumatic output signal. This signal is then transmitted through tubing to indicating or recording receivers or controllers.

Range limits are —375 to +1000 F and 40 to 500 psi. A simple adjustment allows the span of the transmitter to be set to any value within the span limits of 20 psi and 50 F minimum, and 150 psi and 400 F maximum. Zero output can easily be adjusted to allow this span to cover any desired portion of the overall transmitter range. Pilot plant operators will find this range adjustment feature particularly useful, since the range can easily be set for the process running at the time, and changed for other applications. The high speed of response and high accuracy also are valuable in such work.

Transmitter is equally accurate at small spans of 20 psi and 50 F or at wide spans of 150 psi and 400 F.

One basic instrument, made from one set of parts but used for all applications, means simplified training of personnel and small spare parts inventories. The short time required to convert a transmitter from temperature to pressure service makes it practical to keep one extra transmitter on a standby basis, to replace either a pressure or a temperature instrument.

A damping dashpot eliminates the effects of external vibration. It is disconnected when a temperature transmitter is converted to pressure measurement; the pressure seal provides adequate damping. To isolate the unit



(139) Electronic Potentiometer Transmits Pneumatic Signal

A new electronic potentiometer, measuring instrument equipped with a pneumatic transmitter that sends a 3-15 psi signal proportional to the measured variable, has been announced by Bristol.

The Dynamaster Pneumatic Transmitter is available in either potentiometer or bridge circuits, and will measure any variable that can be translated into an electrical quantity. It then converts the measurement into a universal 3-15 psi pneumatic signal for transmission to a remote pneumatic indicator or recorder, or automatic controller. Thus, it is possible to present measurements such as speed, viscosity, pH, resistance, smoke density, current and voltage, frequency, and conductivity, etc., on the new miniature pneumatic receivers, along with more conventional measurements of flow, pressure, and temperature.

Standard Bristol electronic and pneumatic components are used in the new instrument. It is available either "blind" or with an indicating scale for at-the-scene measurement.

The Bristol Company.

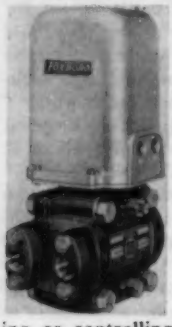
even further, each chassis is shock mounted.

The temperature transmitter is effectively compensated for ambient temperature change by means of a bimetal element. Barometric pressure compensation is provided by an evacuated barometric bellows. When a temperature instrument is converted to measure pressure, two screws are moved to eliminate the effect of the bimetal, since the pressure is unaffected by ambient temperature. When an absolute pressure transmitter is converted to a gage pressure transmitter, the barometric bellows is removed.

Minneapolis-Honeywell Regulator Company.

(131) New d/p Cell Transmitter Features Advanced Design

Major advances in design have been incorporated in a new force balance flow transmitter recently announced by Foxboro, as an addition to its line of differential pressure flow measuring instruments. Designated the 13A d/p Cell Transmitter, it measures differential pressures and transmits a 3-15 psi signal to a receiving, recording or controlling instrument.



The new transmitter provides continuous adjustment over the entire range of 0-50 in. to 0-250 in. of water differential without change of parts. Unitized "block" construction of the three basic parts—body, transmitter and air relay—eliminates the effects of piping stresses. Operating on the force balance principle, the all-metal measuring components and temperature-stable parts such as the Elgiloy stainless alloy sealing diaphragm, maintain calibrated accuracy over a wide range of ambient conditions.

A silicone-filled capsule, with two pressure-sensing Type 316 stainless steel diaphragms, automatically dampens and filters flow "noises" at the measurement source, yet permits high speed response to actual flow. New also are machined over-range stops for protection up to full 1500 psi rating of the instrument.

A convenient external zero adjustment permits the transmitter to be zeroed without removing weatherproof housing. The unit weighs only 21 lbs; is compact for close coupling to orifice flanges.

For closed tank liquid level applications, Foxboro recently introduced the Type 13LA d/p Cell Liquid Level Transmitter. It is essentially the same as the flow transmitter, except that a simple range suppressor spring has been added to the basic mechanism. The spring balances out the effect of hydrostatic pressure in the piping line from the high point of the tank.

The Foxboro Company

(132) New Refinery Refractometer is Rugged

A new process control instrument especially designed for the petroleum and petrochemical industries is in production by Consolidated Electrodynamics.

The instrument — a differential refractometer—has been developed and pilot-produced by Phillips Petroleum Company. Consolidated is making and marketing them under an agreement with Phillips.

The instrument has been designed with plant requirements in mind, and is not an adaptation of laboratory equipment. The unit has been deliberately designed as a simple, compact, rugged and explosion-proof instrument. It has been tested in more than three years of actual use in refineries.

Instrument is capable of continuous and automatic control of such operations as fractionation, blending, and chemical synthesis to improve product quality and yields.

Refractometer is designed to monitor continuously the refractive index of liquid process streams. Among its uses have been automatic control of liquid-stream blending and fractionating-tower operation.

Refractometer measures the difference in refractive index between a sealed-in liquid standard and a flowing sample drawn directly from a process line. This measurement is based on the bending effect caused by passing a ray of light from one medium to another of different refractive index. Beam deflection is proportional to refractive index difference and is readily measured by an optical servo system. A telemetering circuit for strip- or circular-chart recording, or direct control, is provided by a potentiometer geared to the servo motor shaft.

The instrument has been thoroughly field-proved in the Phillips American refineries. It is simple and compact, requiring an area only 4 by 6 ft for installation. The process refractometer is housed in a single explosion-proof bell mount designed for outside use near the sample point.

Consolidated officials point out that this instrument is an important element in the automatic operation of refineries and chemical plants. Before automatic operation, one must have control. And before control, one must be able to measure accurately. This instrument does that. Then, through feed-back systems, it automatically controls the operations.

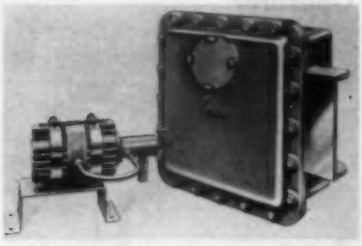
Consolidated Electrodynamics Corporation.

(133) New Concept in Automatic Sampler Design

The Gilbarco Automatic Sampler, claimed to be completely new, is magnetically powered and electronically controlled.

Models are available covering a delivery range from .15-2.5, .25-4 or .5-10 gal per day. Components exposed to the sampling liquid are made of stainless steel for corrosion resistance and long life. Unique design of this sampler permits the setting of new standards of sampler construction that make possible truly reliable and representative sampling.

This sampler is designed for pressures up to 1000 lb. Special self-cleaning check valves are provided to further insure accurate sampling. Use of



an extremely small piston operating at a frequency rate between 20 and 300 cycles per minute assures the collecting of a continuous sample.

The control unit is made for either manual proportional-to-time operation or automatic proportional-to-flow operation through the use of pneumatic regulating devices.

Sampling unit is set up to eliminate packing glands. With liquid flowing around the plunger, no packing is needed due to balanced line pressure. Static seals for protection of the coils are of the "O" ring type and are made of a compound resistant to chemicals and petroleum products at operating temperatures.

Controls for the sampler are contained in an explosion-proof box of cast aluminum. The box has a quick-opening cover for easy replacement of tubes and fuse. The electronic tubes are standard types that are available over-the-counter in any electronic supply shop. Operating current is 115 volt, 60 cycle, single phase.

Gilbert & Barker Manufacturing Company.

(134) Sight Flow Indicators for any Line ½-In. to 2-In.

Jerguson Sight Flow Indicator is designed for applications where it is necessary to observe process variables of flow and color and yet maintain a high standard of safety.

Machined from solid steel bar, the one-piece liquid chamber forms a base to which heavy, heat-treated and tempered glass is tightly locked by means of forged steel covers and heat-treated bolts. The special boro-silicate glass used in this assembly is highly resistant to thermal and mechanical shock, and yet its optical qualities are excellent.

Should extreme conditions cause glass breakage, the resultant breakdown of the pre-stressed glass causes an interlocking fracture which, in the absence of high pressures, will effectively contain the process liquid, thus preventing injury to personnel, loss of product, or damage to inventory.

Indicators are available with directional vanes which give a positive indication of flow. Standard in the transparent two-window type, the reflex one-window type is also used where the objective is to show only whether or not there is liquid in the line. When liquid is flowing the glass will show black, due to the specially designed prismatic window; when the line is empty, the glass will show a silver-white color.

Pressure-temperature ratings vary from 2000 psi at 100 F to 600 psi at 1000 F in transparent double-window types, and up to 3000 psi at 100 F, or 1000 F in the single window or reflex window types. Higher rated flow indicators are available on special order.

Jerguson Gage & Valve Company.

(229) 28-Ft Parabolic Antenna

Availability of a new 28-ft parabolic antenna for tropospheric scatter transmission has been announced by Prodelin.

Antenna feeds have been designed for use in the 450 to 2700 megacycle range. These units are said to be the only large tropospheric antennas on the market for which actual verified manufacturer's pattern and gain measurements are available. Quality control tests are made on these antennas with Prodelin's new scatter site turntable facilities.

Utilizing an aluminum mesh reflecting surface and back-up support, a 65-lb wind load rating is provided. The new Prodelin 28-ft parabolic antenna achieves excellent structural stability through the use of popular tower "K" frame construction using all-aluminum members.

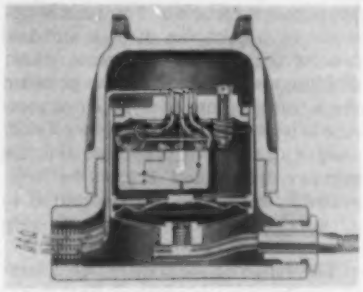
A unique new design feature permits the raising and lowering of the antenna feed to facilitate installation and maintenance. To eliminate transportation problems and minimize damage normally attendant to the shipment of large-crate items, this antenna is shipped in 12 sections each of the reflecting surface and "K" frame members, and then enclosed into two easy-to-handle shipping boxes.

Prodelin, Inc.

(137) Explosion-proof Pressure and Vacuum Switches

These new units are said to be unusually compact, extremely accurate, and to repeat within ±1 per cent of setting.

They are enclosed in an explosion-proof housing, UL approved for hazardous locations; Class I, group B, C and D; Class II, group E, F and G. These listings are for atmospheres containing vapors of ethyl, ether, gasoline, alcohol, acetone, petroleum, naphtha,



lacquer solvents, as well as natural gas or grain dust.

This new line of pressure switches covers the range from 30 in. of mercury-proof vacuum to 150 psi pressure, sensing increasing or decreasing vacuum or pressure.

Standard models are available for single or dual settings. The latter will secure two different pressure (vacuum) limits and actuate two electrically independent circuits, one a-c and the other d-c if desired. The units are automatically reset by the snap action characteristic of the switches.

Barksdale Valves.

(135) Force-Balance Instrument Gives Instantaneous Measurement

A pneumatic force-balance flow transmitter for accurate, instantaneous transmission of differential pressure has been announced by Fischer & Porter. In the new differential pressure transmitter, designated Figure 1575 force-balance transmitter, no working parts contact the process fluid. Fluid pressures are exerted on smooth outside surfaces of two diaphragms which transmit pressure differential through a sealed-in oil chamber between them.

Adjustable damping built into meter unit minimizes pulsation and vibration effects before they reach the transmitting half of the instrument. Transmitter is also stable to pipe strain, static pressure, temperature, posiion, and random flow signal noise.

Meter body and transmitter are separate assemblies for greater accuracy and ease of adjustment or maintenance.

All connections, including supply and output piping, are incorporated in the rugged meter body, eliminating the effect of strain from these lines.

Internal hydraulic temperature compensation gives transmitter stability to temperature variation. Transmitter operates by application of high and low process pressure to the measurement diaphragms. With the low pressure diaphragm floating freely, the low pressure is transmitted to a silicone oil seal. Output air pressure, proportional to the pressure differential across the high pressure diaphragm, is transmitted to an indicating recording or controlling instrument.

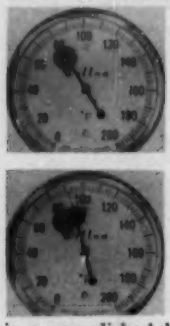
The range of the transmitter is continuously adjustable from 0-20 to 0-200 in. of water and has an output of 3 to 15 psig. Pressure rating is 1500 psig and temperature rating is minus 20 to plus 300 F. Temperature effect on calibration is less than one per cent per 100F, and static pressure effect is less than one per cent per 1000 psi. Overrange protection is plus or minus 1500 psi.

Unit measures 4 by 5 by 10 in. and weighs 20 lb.

Fischer & Porter Company.

(277) Thermometer Signal Guards Against Variations

Something new in the field of thermometers is the Signal Eye feature now being offered by W. C. Dillon.



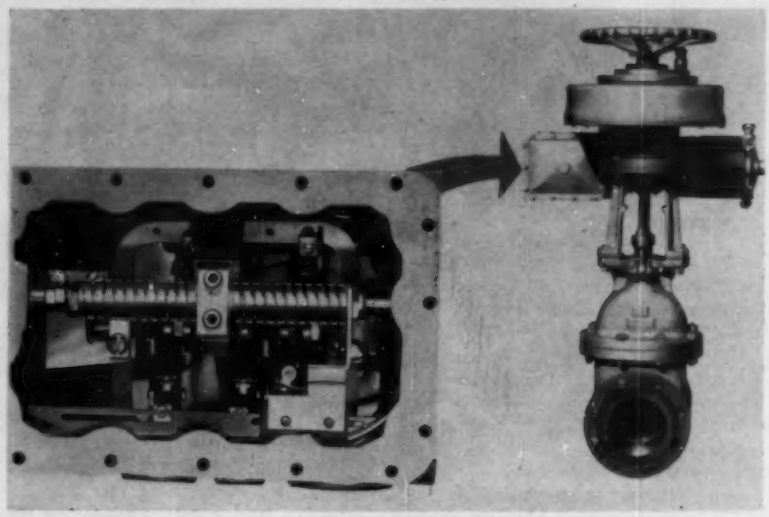
Development has been brought about by numerous requests for some type of visual and vivid warning signal that might tell the operator even from a distance of 50 ft, when normal temperature readings rise or fall. It is accomplished by a bright red disc affixed to the pointer. An opaque disc of the same diameter is attached to the dial glass over the spot where it exactly coincides with the red disc. Slightest temperature variation causes the pointer to fluctuate above or below the opaque circle.

Applications for the Signal Eye thermometer are usually found in those places where height or distance makes it impractical to read the actual temperature and where it is important only to know that it is off norm. The opaque disc can be quickly repositioned by the operator should a new standard operating temperature be selected.

Thermometers are available in 3 in. or 5 in. diam dial sizes and in stem lengths from 2½ in. up to as long as 72 in. Fahrenheit ranges vary from —40 to +160F, with intermediate ranges and a high of 200-1000. Centigrade ranges run from —10 to + 110C, and up to 0-300C. All are individually calibrated to an accuracy of 1 per cent the full scale reading.

W. C. Dillon & Company, Inc.

(276) Improved Motor Valve Operator



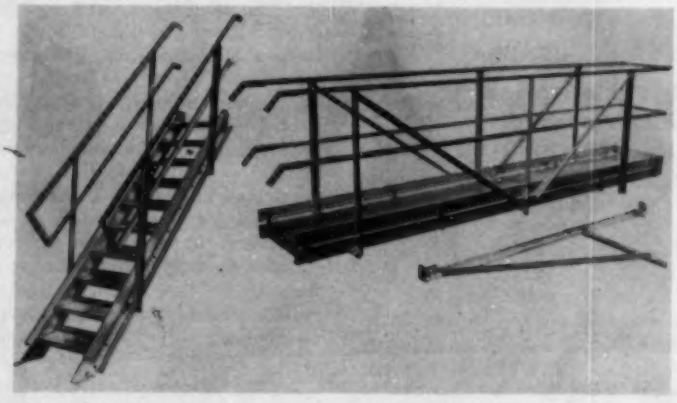
Tork-Master motor valve operators are manufactured for all makes and types of valves including a model recently introduced that makes it possible for motor actuation of wrench-operated plug valves. Tork-Master units may be installed on standard valves from two-inch size up to the largest models.

Recent redesign of the Tork-Master switch compartment has been effected, which makes available as many as 10 limit switches for varied sequence operation of related equipment. All switches are individually adjustable throughout the range of the valve travel.

The unique, simple method of Tork-Master patented mounting on standard valves provides for adaptation of the motor operator on valves already installed in the line without exchange of any valve parts.

Tork-Master Division of Harvill Corporation.

(129) New Trussless Steel Stairways, Walkways



A new design of steel stairways and walkways for industrial installations which eliminates the need for supporting truss rods has been announced by Columbian Steel Tank. Dual hand rails, which also provide an additional safety factor, serve as the supporting truss, suspending the walkways and stairways rigidly when bolted to the structure. For interior installations or bridging, floor space conservation is a distinct advantage of the design.

The stairways, with safety treads, are fabricated in 4 ft, 6 and 8 ft sections which may be bolted together in any length and any practical height. The sections come equipped with toe boards, angle iron hand rails and supports. The standard design is 26 in. wide, prime painted with oven dried

coat of aluminum finish paint. On special order, the sections may be hot dipped galvanized after fabrication.

Columbian Steel Tank Company.

Heat Exchangers

(143) Welds Thin Tubes for Heat Exchanger

Sample tube welds are shown in the photograph being made by a special

torch designed by engineers of Griscom-Russell.

The torch, which employs an inert gas tungsten arc welding process, is said to be the first device developed for automatically welding a tube with an extremely thin wall.

In the process, tubes for heat exchangers are joined to a tube sheet automatically with a small bead being laid around each tube end. Griscom-Russell, a pioneer in the heat exchanger field, has used this equipment on a project involving tube welds on units to be used in connection with nuclear power plants for ship propulsion.

The Griscom-Russell Company, a subsidiary of General Precision Equipment Corporation.

(145) Low-Temperature Insulator

Development of a new low-temperature pipe insulating material that combines high insulating value with the elimination of the installation steps of wiring, pointing and painting has been introduced by Armstrong Cork.

Called LT Cork Covering, the new insulating material is made of precision-cut segments of Armstrong Corkboard adhered to a backing of asbestos and aluminum-laminated paper. The asbestos paper provides a highly fire-resistant finish, while the vaporproof aluminum foil seals out moisture vapor.

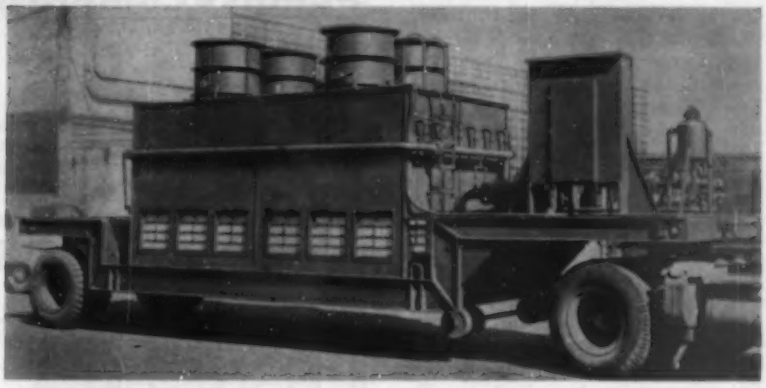
Covering is applied by merely wrapping it around low-temperature lines and using adhesive to seal the lap, thus eliminating the necessity for bands, staples, or wire. In applying the material to fittings, workmen are able to saw LT Cork Covering to the needed shapes and sizes on the job. In addition, the white asbestos exterior jacket of the material makes finish painting unnecessary on indoor installations.

Elimination of the need for staples and wire not only cuts installation time, but also eliminates the danger of puncturing the aluminum-laminated paper vapor barrier, thus preventing condensation and frosting. An additional advantage is that if lines are to be switched at any time, the insulating material can be removed and reused on a new line.

For handling ease, during shipment and on the job, LT Cork Covering is cut in 36-in. lengths and will accurately fit all sizes of iron pipe or copper tubing from ⅛ in. up. Covering is manufactured in three standard thicknesses to meet varying temperature requirements. LT-Thirty is made in 0.8-in. thickness for use on lines operating at 30 F or higher. LT-Zero, 1.5-in. thick, is for lines operating as low as 0 F. LT-Minus Thirty, for use on lines operating at temperatures as low as 30 below zero, is made 1.5-in. thick for pipes up to 1¼ in. ips; 2-in. thick for pipes to 8-in. ips and 2¼-in. thick for larger pipe sizes. For temperatures below —30 F, special thicknesses are available on order.

Armstrong Cork Company.

For more information on this Equipment see page E-20a



(144) Portable Water Cooler

A unique, portable water-cooling tower developed by Badger Manufacturing may well prove to be the answer to a number of industrial situations where limited cooling water supplies have been a production bottleneck.

The Badger unit is a complete package plant on wheels. Compact and lightweight, it is equipped with all necessary accessories such as pumps, strainers, electrical control equipment, pressure gages, thermometers, and feed water conditioner. Design capacity of the unit shown is 240 gal per minute of 115 F water reduced to 90 F when operating at 95 F air temperature and 80 F wet bulb.

This tower is presently being used in conjunction with portable oxygen-generating plants in remote locations. According to Badger, the unit may well answer a need in many water-starved plants at home and overseas. Small chemical plants could use it.

The tower pictured is constructed of steel and is packed with 20-in. Fiberglas. The entrainment separator is a special copper mesh, and the four axial flow fans have a capacity of 11,000 cfm each. The entire cooling plant can be shipped as a unit.

Badger Manufacturing Company.

(141) Three 'Firsts' in New Tube Expander Control

A tube expander drive called the Torq-Air-Matic, incorporating three "firsts," has been developed by Thomas C. Wilson. It is claimed to be the first all-air driven tube expander drive, the first to offer a control entirely free from the effect of operating variables and maintenance problems, and the first to provide a control with torque output calibrated in terms of foot-pounds.

The Torq-Air-Matic method of registering torque at the output spindle prevents tubes from being over-rolled or under-rolled. The readings are precise and consistent regardless of tube sheet hole variations. This control feature also eliminates overstressing of tube sheets, reduces warpage and ligament "push-over." Tube bowing is held to absolute minimum, which increases the efficiency and tube life of heat ex-

change units. The Torq-Air-Matic can be handled in the same manner as a conventional flue roller. Operating in-

structions read in part: "Slam it home. Pull the trigger. If you want to rest, lean on it."

This tube expander drive is an all-air rotating type control. It will produce 14 ft-lb torque at 90 psi with maximum consumption of 12 cfm of air. It is completely self-contained, which eliminates the need of separate control cabinets, cables, and other connections. Tool accurately controls tube expansion by directly measuring torque output at the output spindle right at the mandrel for maximum convenience and efficiency. By measuring torque at this point, motor wear, changes in the quantity and viscosity of lubricants, and pressure fluctuations, do not affect measurements.

The basic unit is of the pistol-grip design and is furnished with an auxiliary handle that may be swivelled to any position desired by the operator. Oil reservoir has been built into the handle. The total weight with the auxiliary handle is approximately 7½ lb and the length is 10 in.

Thomas C. Wilson, Inc.

(142) Large Vertical Upfired Heaters of Unique Design

Petro-Chem Development Company, which designs and manufactures Petro-Chem Iso-Flow furnaces for the refining, petrochemical, and chemical industries, recently completed a large installation of furnaces that embody unique design features.

The furnaces were built for the Sinclair Oil Company at its refineries in Marcus Hook, Pennsylvania, and Houston, Texas. They are cylindrical, vertical, upfired heaters in which all of the heat is absorbed by the charge in a double-row radiant section. Extremely high efficiency is obtained by the general design, enhanced by the use of Ljungstrom air preheaters.

Unusual feature of these heaters is that the circulation of the air for combustion and flue gas is accomplished by use of a cold forced-draft fan only. The furnace setting is constructed to operate under the necessary pressure to force the flue gas through the air preheater to the stack. All portions of the furnace structure are sealed against pressurized high-temperature flue gases.

The combustion chamber is equipped with special pressurized observation doors that permit complete inspection of all parts of the oil-heating surface and internal high-temperature parts.

Units range in size from 36,000,000 to 175,000,000 Btu release. The four smaller units are installed at Houston for the new 25,000 bbl/day reformer recently placed on stream there. The three larger pressurized heaters are a part of the new crude and vacuum unit in the Sinclair refinery at Marcus Hook.

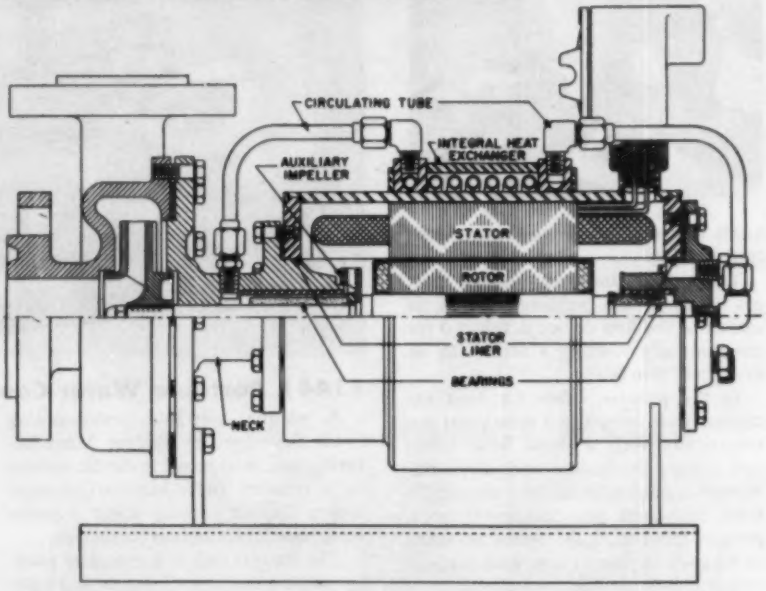
Also at Houston, in addition to the smaller pressurized heaters, Petro-Chem has installed two large Iso-Flow heaters of standard design, each of about 100,000,000 Btu release, which furnish heat as reboilers to the fractionating towers.

Petro-Chem claims that the pressurized heaters at Houston, after a month's operation, have demonstrated that all of the details of design necessary to pressurize large heaters have been satisfactorily solved, and that the economies of construction and operation inherent in the use of a single cold-air fan and elimination of the hot-flue gas fan can be fully realized.

As these units are completely sealed and all possibility of flashback from furnace burners eliminated, they may provide an answer to the problem of furnace installation in relatively hazardous areas.

Petro-Chem Development Company, Inc.

Pumps-Compressors



(147) High-Temperature Canned Motor Pumps

Several new seal-less centrifugal pumps have been developed by Chempump Corporation. One of the latest is the Series T Chempump, designed specifically for high-temperature, leak-proof pumping. Units (see table for sizes) can also be adapted to handle slurries.

A necked down area between pump chamber and motor section provides a thermal barrier to the transfer of heat from the fluid being pumped. Further cooling is provided by a wrap-around heat exchanger. Among the many hot "problem" fluids easily handled are Dowtherm, Arochlor, Para-Cymene, hot vegetable and mineral oils, and fatty acids. It is said that fluids can neither leak nor be contaminated when pumped by the Chempump.

Secret of these units is the seal-less design in which pump and motor are built together as an integral unit. Pumped fluid is allowed to circulate around the rotor, shaft, and bearings in a chamber created by a non-magnetic, corrosion-resistant liner placed in the motor air gap. This liner prevents pumped fluid from coming into contact with stator windings. Rotor chamber

	Series Model	HP	Max. Head (feet)	Max. Capacity (gpm)
T	CFT-¾-¾	¾	90	55
	CFT-3-1½	3	90	120
	CFHT-1½-¾	1½	140	48
	CFHT-3-¾	3	180	70
	CHT-5-1½	5	160	200
	CHT-7½-1½	7½	190	200

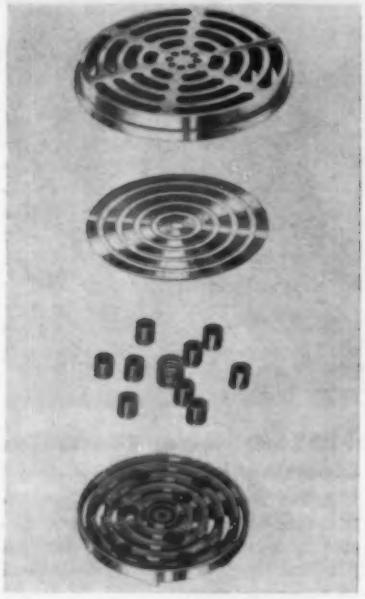
fluid cools bearings, rotor and stator and also lubricates the bearings.

Additional cooling is provided by circulation of rotor chamber fluid through the wrap around heat exchanger. When handling slurries, a filter is placed in the necked down area to keep rotor chamber fluid clear and free of particles. No maintenance of this filter is required.

Chempump Corporation.

(146) Valves Are Heart of Gas Compressor

The gas compressor — one of the most important tools in today's far-flung oil and gas industry — is only as



efficient as its suction and discharge valves. The design and performance of these compressor valves determine largely the efficiency and maximum capacity of the compressor and its economy in power consumption. Compressor valves also influence cost of maintenance and production losses due to valve trouble or failure.

Voss Valves are used to replace the original valves in compressors of any size, type, and make operating in the refinery, gas, and oil industries. They are individually computed, designed, and built to operating conditions of the compressor in which they are installed. Voss Valves are often specified as part of the original equipment on new compressors.

Unlike many compressor valves, Voss Valves are *machined* from solid bars or forgings of finest alloy steels suitable to the application, are heat-treated for proper hardness and finish, and ground on special concentric surface grinders. Valve Rings are also machined (not stamped), hardened, and precision ground. The springs used in these valves are designed for long life, even in high-temperature service. Each spring straddles two adjacent rings, providing smoother and more durable operation.

J. H. H. Voss Company, Inc.

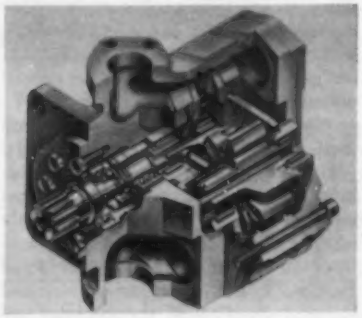
(149) Pumps for Heavy-Duty Service

The Hydreco Division of New York Air Brake has developed a new series of 150 hp, 1500 psi hydraulic pumps for heavy mobile and industrial equipment. Pumps in the new 3600 series are especially engineered for installations where space is extremely limited and where adverse conditions exist.

These pumps will deliver 65-90-110 gpm at 1200 rpm, depending on the model. Speeds range to 2000 rpm; pressures to 1500 psi, and fluid horsepower to 150 hp.

Companion control valves have also been designed for the new high-volume series.

Extensive field tests on a wide range of equipment have been run over the past two years, and results show between 75-85 per cent reduction in pump and accessory maintenance,



compared to similar equipment.

The high capacity of the new series now makes it possible for designers to consider hydraulic operation and control for larger stationary and mobile equipment previously driven by mechanical and other methods.

Hydreco Division, The New York Air Brake Company.

(148) New Chemical Slurry Pump

The new Manzel Slurry Pump embodies important exclusive features promising lifetime, dependable, trouble-free service.

Its outstanding characteristic is the ability to pump slurries at rates varying from its maximum capacity to approximately one fifth of maximum. In consequence, the proportion of solids in the mix tank can be kept constant, while the amount of solids delivered by the pump can be varied by means of the exclusive Manzel Slurry Pump Stroke Adjuster.

Pump comprises one or more transparent pump heads mounted on a cast iron gear case, which also contains the pump diaphragm operating mechanism. Dial for adjusting the rate of delivery of the pump is mounted on the cover of the gear case.

Capacity of the pump, when direct-connected to a 1725 rpm motor and pumping against a pressure of 100 psig, can be adjusted from a maximum of approximately 15 gal per hour to a minimum of approximately 3 gal per hour.

The transparent plastic pump head is suitable for operating temperatures up to 100F. It contains the diaphragm chamber, the inlet and discharge valves, and a sediment well and trap located below the inlet valve. When two pump heads are mounted on a gear case, one head may be used for pumping slurry and the other for water treating or other solutions.

Manzel's pump diaphragm is a reinforced synthetic rubber, resistant to hypochlorite and similar chemicals. The discharge valve is spring loaded to insure prompt closing and prevent back flow into the diaphragm chamber. There is no need for the inlet valve to be spring loaded since the pulsations of the diaphragm cause it to close promptly at the start of the discharge stroke. All metal parts in the Manzel Slurry Pump head are of stainless steel.

Manzel Division, Houdaille Industries, Inc.

Treating

(271) A Versatile Corrosion Inhibitor

Introducing new additives into petroleum products is becoming constantly more complex when considered in the light of all the various fuel types, compatibility with other additives, and the overlapping specifications set by the marketer, the military, the pipeliner and certain large-volume consumers. Consequently, any single additive that can be used where two or more have been required previously is an important contribution to the industry.

Universal Oil Products claims it has successfully developed such an additive in Unicor — an oil-soluble, film-forming corrosion and rust inhibitor, and anti-fouling agent. Normally it is used in very small quantities, ranging in order of magnitude from 2 or 3 up to 20 parts per million.

Unicor may be used for the following two widely dissimilar applications:

a) Preventing internal corrosion and fouling in anaerobic process units

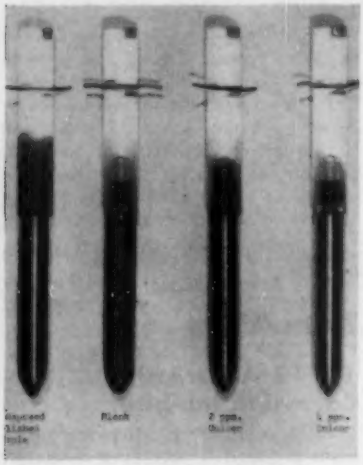
such as fractionators, condensers, strippers, and other processing equipment

b) Protection against corrosion and product contamination in pipe lines, storage tanks and tankers under moist, aerobic conditions.

Unicor is said to be exceedingly efficient in both of the above applications. For example, when Unicor is injected upstream of an overhead condenser to control a corrosion and fouling problem, it subsequently will provide additional protection from rust for storage tanks, pipe lines and other incidental downstream equipment. In the past, it has been necessary to use two separate additives — one to control plant corrosion and fouling problems, and an entirely different one to prevent corrosion and fouling of storage and transportation equipment.

The high activity and low unit cost make Unicor an economical additive to use, however, even if it is used specifically by the pipeliner or refiner for a single job.

Universal Oil Products Company.



Performance of Unicor in ASTM Steam Turbine Oil Corrosion Test (Modified) using 300 cc regular gasoline containing 30 cc distilled water, in exposures of six hours at 100 F.

(153) New Line of Industrial Filters

The R. P. Adams Company now has a new filter line in the IWF Industrial Filter.

Features of the IWF include: the efficient high-flow backwash design, which eliminates disassembly for cleaning; a choice of five basic sizes in numerous arrangements of multiple units in each size; four different filter elements — Poro-Stone, Poro-Carbon, Poro-Screen and Poro-Edge — to provide a suitable septum for most process needs; high-polish, diatomite filtration with or without continuous body feed; batch or fully continuous "on-stream" operation; and standard of ASME construction.

The high-flow backwash design of the Adams WFF Filter is retained in the new IWF unit. In this design, a compressed air head is developed in the high dome of the filter shell. Compressed air acts as a dynamic force that drives the backwash liquid in a reverse direction through the filter elements when the backwash valve is open.

High initial backwash flow rates are obtained because the compressed air is acting on the entire surface area of the backwash liquid. These high reverse-flow rates are sustained for a longer period of time due to the stored energy available from compressed air.

This sustained, high-flow reversal of the backwash liquid purges the filter element pores of all foreign matter.

R. P. Adams Company, Inc.

(151) Bulk Shipment System for Gasoline Inhibitor Perfected

To provide petroleum refiners with the economical advantages of bulk shipment, Eastman Chemical has perfected a system of shipping and handling its Tenamene 2, a phenylene diamine type of gasoline gum inhibitor. System involves shipment by tank car designed to be received at a special unloading station at the refinery.

While Tenamene 2 additive has been used by refiners in volume the past years, the traditional method of shipment by drum is considered to be an uneconomical method. A special study of the bulk handling problem was instituted in cooperation with a number of Eastman's Tenamene customers, and the first shipment of the inhibitor under the new method was made earlier this year to a major refiner in the Gulf Coast area. Unloading stations at other refineries are now on the drawing boards.

Developing the new system involved the design of a special tank car to permit adequate protection of the liquid during loading at the point of origin, shipment en route, and unloading at the refinery so that its high quality would be maintained equally as well as formerly experienced in the drums. The key to this phase of the system is loading the tank car under a slight pressure of an inert atmosphere.

At the same time an unloading station for the tank car was designed to enable the refinery to handle the bulk quantity of Tenamene 2 safely and quickly. Eastman, working with refinery engineers, developed three methods to provide a multiple choice and flexibility for refineries with varying plant situations. Any one of the three methods will prove satisfactory for the unloading operation.

In each case, adequate safety devices have been built into the system so that the quality of Tenamene 2 is unimpaired during handling. Because refineries differ in the problems that must be met in receiving the bulk tank car shipments, Eastman makes available a design service through its customer service laboratories to develop the best possible methods for handling the inhibitor for each user.

Eastman Chemical Products, Inc.

(152) Collector Boosts Gas Cleaning Efficiency

A mechanical collector of the multiple-tube type incorporating new design principles to increase the gas handling capacity has been announced by Research-Cottrell.

Designated the "Cyclo-trell," the new design is said to have a higher collection efficiency and a greater gas flow for a given pressure drop than has been previously obtainable in conventional multiple-tube collectors. The greater capacity means fewer tubes per unit are needed, resulting in a lower total cost for a given capacity and efficiency.

The Cyclo-trell consists of a series of cyclone tubes arranged in parallel, and depends on centrifugal force for its operation. Incoming gas enters the chamber under pressure and flows into the lower set of inlet tubes, which are attached to the lower header plate and are of slightly larger diameter than the upper outlet tubes. Specially designed inlet vanes at the mouth of the inlet tubes test up a circular motion in the gas so that suspended particles are forced downward and outward against the wall of the inlet tube. Cleaned gas is first forced toward the center of the collector tube and then upward and into the outlet tube by the pressure differential.

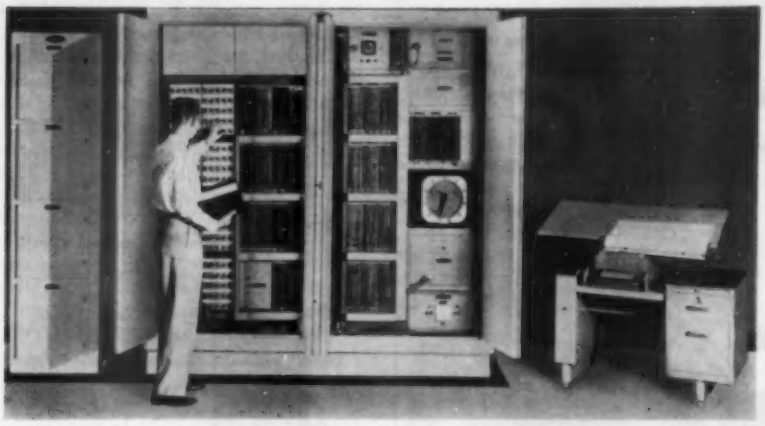
A unique engineering feature, developed by Research-Cottrell and incorporated in the Cyclo-trell, is the design of the aerodynamically shaped inlet vanes, which provides a faster and smoother gas flow. Purpose of the inlet vanes is to start a fast spiral of incoming gas with a minimum of turbulence. The faster the gases spin, the greater the centrifugal force on the suspended dust in the gas stream. "Drop out" and collection efficiency are higher as this centrifugal force is increased. Use of the aerodynamically shaped vanes minimizes gas turbulence and increases the centrifugal force.

Outlet vanes serve the function of recovering energy in the outlet tube, thus increasing the capacity of the tube. This results in fewer tubes per unit. The vanes are positioned below the tube to decrease entry losses at the tube.

The shell and hopper of the Cyclotrell are of seven-gage bolted steel construction, with cast-iron inlet tubes and vanes to resist the abrasive force of incoming gas.

Research-Cottrell, Inc.

Computers



(155) Data System Tailored to Plant Use

Panellit has recently built and installed an automatic information system that can be used for refinery and petrochemical plants.

The automatic information system performs dual monitoring functions. The output millivoltage signals of 119 translation devices (of process variables) are connected into the system. The system examines or scans continuously the field input signals and calls attention to any abnormal value by causing a bell to sound and causing the value of the abnormal quantity to be measured and typewritten on a log chart and/or punched on a tape.

Once each hour, the information system changes operational modes and measures the value of each field variable as received from the analog translation devices. Each value is sequentially measured and recorded on the process log chart under the proper identifying caption. The values are printed from left to right in three chart areas or segments. When the first line is completed, the carriage returns and the platen or roller moves the paper to the next segment.

At the beginning of each log, an internal system test program is initiated automatically and at its conclusion a letter "T" is printed in the left-hand chart column. The time of the entering of the log is printed in the next column and the analog values (converted to digital readings) are recorded next. The "T" and time are entered at the beginning of each segment although the test program is not repeated between segments. In addition to the log chart, a tape punch machine may be operated at the same time that the chart is printed. The tape may be used to make IBM cards containing the process variable information for use in a computer or data analyzing system.

Each periodic log of the chart is printed with the variable values in black in the upper chart segments. If a variable is abnormal at the time that a log cycle is initiated, the value is logged in red. When scanning operation is in progress, any abnormal or alarm values are printed in red in the lower or off-normal section of the log sheet. When a value first becomes abnormal, it is recorded and then a memory detector prevents it from being recorded during each subsequent scan cycle. When the value returns to normal during scanning operation, the value is printed once more, but in black.

Once every 24 hr, there is a special total log printed immediately following the hourly log. The typewriter prints total flow values while spacing through all other chart columns in all segments. The flow values are derived from differential pressure transducers, integrators, and accumulator circuits. There are 1 hr accumulators for the hourly log flow values and time compensation circuits to permit flow values to be recorded during **demand** logs (when the operator presses an **on-demand** log pushbutton).

Panellit, Inc.

(156) Solve Linear Algebraic Equations

Solution of linear algebraic equations and of problems in linear programming by an analog computer is made possible through a new computer developed by Reeves Instrument.

Patterned after the Reac Reeves "400" Computer series, this new computer can obtain solutions to as many as 15 simultaneous linear algebraic equations. It can also solve problems in linear programming involving up to 15 unknowns, evaluate determinants or any of their minors, or form the product of two or more matrices.

Programming is performed by setting input potentiometers, with no rearrangement of equations being required. Solutions are presented on a digital voltmeter and on a printer, and are accurate to the equivalence of three to four figures. Linear simultaneous equations may be solved to as many decimal places as may be desired by a simple iterative technique.

The same high-quality components employed in the Reac "400" Computer are used throughout the Algebraic Computer. Output voltages are developed by individually stabilized, drift-free amplifiers of the type used in Reac Computers.

A special version of the standard Algebraic Computer can accept the output from a mass spectograph and provide direct, instantaneous read-out of chemical component distributions.

Reeves Instrument Corporation, a subsidiary of Dynamics Corporation of America.

Storage - Process

(158) New Positive Seal for Floating Roof Tanks

Floating-roof tanks are used in the storage of volatile and corrosive liquid products in the petroleum, chemical, and petrochemical industries in order to (1) reduce evaporation losses, (2) decrease corrosion, and (3) eliminate fire hazards.

The Hammond Tubeseal System (Patent No. 2,735,573 issued February 21, 1956), through its design and construction, completely eliminates all

O.K. BOYS BREAK IT UP!

Even after sedimentation, separation and chemical treatment of slop oils and refinery waste, you wind up with a knotty problem, that is, a highly stable interfacial emulsion. This is difficult to break, with too much oil in it to lose and too much contamination to allow discharge to waste. That's common knowledge.

But, today, a number of refineries have proved that this problem is easily solved by filtration with Dicalite Filteraids. Dicalite breaks this tough emulsion in two ways. First, the fine solids that help to stabilize the emulsion are filtered out. Second, the oil and water globules are ruptured as they pass through the filter cake. The filter effluent readily separates into oil and water layers... the oil is, of course, already "upgraded" for easier reprocessing, the water is so free of oil (only 2 ppm were found in one State Waterways Authority check) that it may be discharged to waste without danger of stream pollution, or re-cycled for process water in some cases.

Dicalite filtration of refinery wastes recovers 5,300-5,900 bbl. of oil per month for one refinery, making it a highly profitable operation. Others report that oil recovery will pay for the entire filter installation in two years, and then probably show a profit.

Why not investigate the advantages Dicalite filtration can give your operation -- write us!

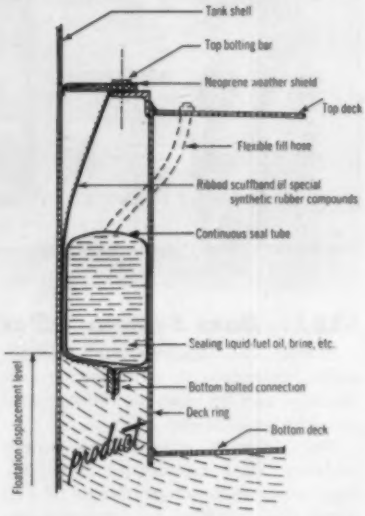
Dependable GLC GREAT LAKES Dicalite® DIATOMACEOUS MATERIALS

DICALITE DIVISION: GREAT LAKES CARBON CORP.
612 S. FLOWER ST., LOS ANGELES 17, CALIFORNIA

vapor space in the seal area, thereby preventing air-vapor mixtures from forming. In addition, the Hammond Tubeseal provides a tight seal at all times so that the stored product cannot evaporate or be contaminated.

System consists of an abrasive-resistant scuff band of oil-resistant synthetic rubber, and a tube of similar material filled with kerosine or light fuel oil. The scuff band and tube are of vulcanized construction with no cemented or sewn seams.

When space exists between the roof and the shell of a tank, the manufacturer points out, it is here that air-vapor mixtures form. If the stored product is sour crude, corrosion of the tank shell and rim plates will also occur. If the stored product is of intermediate volatility, such as jet fuel, combustible vapors wil lexist in this space



under all normal atpospheric temperature ranges. Any ignition, as from lighting, will cause violent combustion unless the housing is absolutely gas tight.

Tubeseal, in addition to providing a positive, tight seal at all times, completely eliminates vapor space and prevents air-vapor mixtures from collecting. Being of softer material than the tank shell, the Tubeseal cannot wear or abrade the latter. In freezing weather, the Tubeseal pulls away with a peeling action, permitting movement of the deck without any possibility of freeze-up.

Gasolines, jet fuels, sour crudes, light crudes, alcohol, napthas, and polyesters are a few of the many products that can be used with the Tubeseal System. In addition, the Tubeseal is particularly suited for the storage of corrosive chemicals and those that are highly inflammable or explosive. The Tubeseal material is not affected by ammonia vapors.

Hammond Iron Works Company

(157) Plastic Laminate for Vessels

A new fluorocarbon plastic laminate with high-temperature and extreme chemical resistance has been developed by M. W. Kellogg.

This new laminate, consisting of a thin — 10-12 mil — continuous layer of KEL-F Plastic on glass cloth, can be adhesive-bonded to almost any contoured surface. Vessels ranging from rectangular plating tanks to complex reactors involving flanged pipe connections and dished heads, have been lined throughout with the material.

Economy-wise, it has been found that this KEL-F Plastic laminate installed on carbon steel is more than competitive with many alloy metals. Still lower material costs are expected for a lighter gage laminate designed for applications requiring the special anti-sticking qualities of this fluorocarbon plastic.

Development of this material gives designers a new lining for tanks, vessels, reactors, drums, pails, pipe, chutes, hoppers, fume hoods, and ducts. Other applications envisioned include surfacing for laboratory bench tops, chemical plant floors, foundry parting boards, concrete forms, conveyor belting, resin casting forms, and foam rubber molds. It is also expected that, as surfacing, the laminate will considerably broaden the effective application range of reinforced plastic or honeycomb structures.

Techniques for installing KEL-F Plastic laminate have also been developed by Kellogg. The basic steps involved include: (1) cleaning and roughening the surface to which the laminate is to be cemented; (2) cutting and fitting the laminate; (3) applying adhesive to both laminate and supporting surfaces; (4) holding the laminate in place until the adhesive sets; (5) sealing the seams, and (6) testing electrically for the presence of pinholes and incomplete seams.

Fabrication-wise, the sheets can be handled easily. They can be cut with a knife or tailor's shears, and can be either cold or hot-formed to flat surfaces or those with compound curvatures. Their other properties parallel those of the plastic with which they are produced, including: high resistance to temperatures approaching 400 F and low temperature flexibility; excellent resistance to chemicals — alkalies, mineral acids, strong oxidizing acids, and solvents; low permeability to moisture, organic and inorganic liquids and vapors; high abrasion resistance and tensile strength; low cold flow and high impact resistance; high dielectric strength and electrical resistivity; and non-toxic, non-sticking characteristics.

The M. W. Kellogg Company.

TRIPLE ADVANTAGES EFFECTED BY *National-U.S.* EVAPORATIVE CASCADE COOLERS...

at the sulphuric acid plant of The Eagle-Picher Company Galena, Kansas

A unique installation of National-U.S. large evaporative cascade type coolers is solving the cooling problem for The Eagle-Picher Company in the manufacture of sulfuric acid at Galena, Kansas.

Each cooling unit combines the water cooling principles of a conventional wood tower with the heat exchanger principle of National-U.S. cast iron cooling sections through which the acid flows.

The advantages are three-fold:

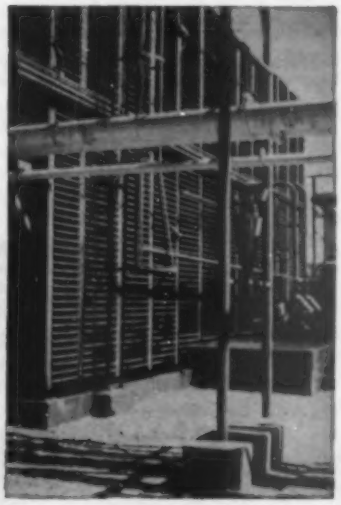
1. **SAVES WATER in an area where water is scarce—makeup quantity equal to evaporation and blowdown losses only.**
2. **SAVES SPACE—takes up little more room than a conventional raw water cooling system.**
3. **SAVES IN FIRST COST—because of reduced space and by eliminating a separate cooling tower.**

The entire cooling area is blanketed with spray from a series of jet nozzles forming a checkerboard umbrella of water over the coolers and pit. Water circulation quantity is two-and-a-half times that of a conventional installation. A proportionate cooling effect is exerted on the heated water from the heat transfer surface, plus considerable evaporative effect from warm water on the surface of the sections.

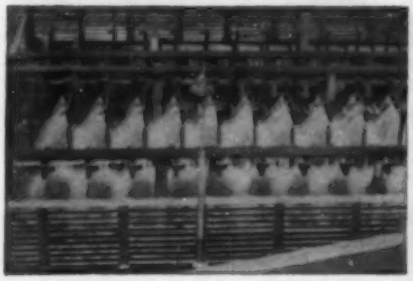
Over two years of operating experience has proved the efficiency and the triple advantages of this installation of coolers designed by National-U.S. engineers.

For full information, get in touch with National-U.S. Heat Transfer Division, whose engineers will also be glad to discuss your particular cooling problems with you.

Exterior view of the coolers at Galena, Kansas sulfuric acid plant of The Eagle-Picher Company. Note the resemblance to a conventional cooling tower. Circulating water pumps can be seen at the left.



Looking down on water sprays in operation at the evaporative cooler. (Installation was made by Leonard Construction Co., Chicago.)



HEAT TRANSFER DIVISION

National-U.S. Radiator CORPORATION

HEAT TRANSFER DIVISION HEADQUARTERS
342 Madison Avenue, New York 17, New York

(161) New Catalysts Feature High Stability

Davison Chemical recently introduced a new family of high stability synthetic fluid petroleum cracking catalysts. They comprise an important group in Davison's new "Gyrocat" line of balanced catalysts.

Today's high cracking severities and maximum through-put operations of fluid catalytic cracking units subject the catalyst to increasingly severe conditions of deactivation. High thermal stability is now a primary requirement of a superior catalyst. High stability catalysts have proven their ability to maintain higher activity and surface area in both laboratory and commercial operations.

This superior thermal stability is demonstrated by its resistance to structural collapse at high temperature.

Successful utilization of high stability catalysts in commercial fluid units of different designs has substantiated the laboratory findings. They have demonstrated ability to maintain higher activity, surface area and pore volume at the same daily addition rate, or to maintain the same activity and surface area with a lower catalyst consumption.

New catalyst differs from the previously produced silica-alumina catalysts in its physical structure. While its most obvious characteristic is a lower particle density resulting from a more porous structure, superior stability is accomplished by control of the size of the filaments constituting its skeleton.

Catalyst pore volume and diameter can be increased by a wider spacing of the skeletal filaments. However, it is possible to increase the diameter of these filaments while increasing their spacing. It is the practical control of these structural changes that results in the improved stability.

The increased pore diameter makes the catalytically active sites of the catalyst more accessible. For the same reason, the air required to burn each pound of coke was also reduced.

High stability M-S catalysts possess the proven physical advantages of Davison's regular M-S(R), and are available in four particle size distributions as either 13 per cent or 25 per cent alumina catalyst.

Davison Chemical Company Division of W. R. Grace & Company

Valves—Fittings

(260) New Torque Control Impact Power Wrenches

The petroleum industry will be interested in a new air-operated nut-running tool which impacts the nut to a desired preset torque for precision tightness, then automatically shuts itself off. In the development of this "Torque Control Impactool", Ingersoll-Rand has claimed to be the first to apply torsion bar principle to torque control. The new tool should prove very valuable on applications where accurate torque control is needed.

While the nut is being run to required torque, the Impactool operates at normal speed, but when required torque is reached, the impact mechanism rebounds instantly and trips a rubber-faced shutoff valve. In addition to combining precision control of torque with the power and speed of Impactool operation, the tool has the following advantages:

1. *The torque setting is simple.* The tool can be easily set to the required torque in a few seconds.

2. *The torque setting remains constant* for any nut-running operation until the adjustment is changed. Releasing the trigger resets the tool automatically to the same torque for the next nut.

3. *The torque control is consistently accurate.* In running one hundred ⅞ in. high-strength bolts where the desired torque was 510 ft lb, test readings showed that the maximum torque was 538 ft lb, the minimum 470 ft lb. The variation was only 15 per cent, or within 7½ in. each way from the desired torque. Better than 50 per cent were between 495 ft lb and 525 ft lb.

4. *No need for pressure regulators,* since the tool operates at full power and speed.

5. *The tool eliminates over-torque* through the automatic shut-off.

6. *The operation is reversible* with full power in either direction.

7. *Maintenance is low,* since there's no clutch to wear, slip, or require adjustments.

8. *The need for hydraulic or other special test facilities is eliminated.*

9. *Runs nuts fast,* operators not afraid to open throttle wide.

Two sizes are available, the 5040T for work up to 90 ft lb, and the 5340T for work up to 550 ft lb.

Ingersoll-Rand Company

(164) Pipe Compound Seals Corrosives

A new chemically inert pipe joint compound that is claimed to positively seal practically all known highly corrosive liquids and solvents has been developed for services up to 212 F. Known as "John Crane" Chemlon pipe joint compound, its base is DuPont Teflon.

This material is not only impervious to all types of hard-to-handle fluids, but possesses an extremely low coefficient of friction. The latter substantially reduces wrench torque, permitting connections to be drawn up to a greater degree of tightness without undue stress or strain.

The non-adhesive quality of Teflon and the non-hardening characteristics of the compound allow the connections to be quickly and easily disassembled, even after years of severe service.

Chemlon pipe joint compound is particularly adaptable for use on aluminum, stainless, monel, or plastic pipe and is currently available in two-ounce screw-type jars.

Crane Packing Company.

(165) Manufacturer Extends Guarantee

The phenomenal growth of OTM Corporation is said to be due in large part to consistent production of flawless products back up by what is claimed to be not only the first, but also the broadest and most comprehensive guarantee ever given in the industry.

OTM is so certain of the perfection of Blue Ribbon flanges and fittings that the original and exclusive OTM guarantee not only covers replacement, but guarantees against any and all damages resulting from a defective flange. In making such a guarantee, the manufacturer has perfected each manufacturing operation and given exhaustive tests to the final product. In the matter of these final tests, the company has a number of trade "firsts" to its credit.

Another first for OTM is the packing and packaging of flanges. A thick, re-enforced carton is used—and the face of the flange is thorouhgly protected by a packing operation that assures complete safety for the flange and makes storing a simple operation.

Along with Blue Ribon flanges, OTM produces orifice flanges, long, seamless welding necks, welding fittings, and ring gaskets.

OTM Corporation.

Electric Motors

(168) Flat-Type Motor Takes Less Space

Providing maximum horsepower with minimum size, new flat-type motor in totally-enclosed fan-cooled or totally-enclosed non-ventilated designs, has been announced by Diehl Manufacturing.

Designed to meet the specifications for NEMA design "B" motors, the motor was developed for use in operating lathes, pumps, oil burners, exhaust systems and similar applications.

Weighing considerably less than standard motors, the units are of standard radial design, constructed like conventional squirrel cage motors. Easy to disassemble and reassemble, there are no precision alignments or complicated air-gap adjustments with which to contend. An important design feature is that the rotor weight is evenly supported between two ball bearings.

Operating at 208, 220/240 or 550 volts, 2 or 3-phase at 60 cycles, continuous or intermittent duty, the motors are available in ratings ranging from ⅓ to 7½ hp.

Diehl Manufacturing Company

(167) Submersible Pump Motor

A completely submersible, explosion-proof pump motor is now being produced by Leland Electric.

This new motor was designed to overcome vapor-lock problems generally associated with positive displacement suction pumping systems. The increased use of higher octane, more volatile fuels has greatly intensified vapor-lock difficulties, particularly in installations operating in warmer areas or at higher altitudes.

The Leland submersible pump motor installs directly in existing gasoline storage tanks with 3½-in. standard pipe flanges. Gasoline flows between the stator and outer shell for maximum cooling of the motor. A small amount of gasoline also passes within the motor itself, providing bearing lubrication and additional cooling. The motor is rated ¾ hp, 3450 rpm, 60 cycles, 230 v. It is claimed to be the simplest, most reliable, rugged, and widely adaptable pump motor now being offered for multiple-pump service stations and for bulk transfer of volatile liquids.

Gasoline can pass directly through the motor because the stator is completely sealed in an epoxy resin especially formulated for use in gasoline and other solvents. The Leland pump motor is explosion-proof and is listed by Underwriters' Laboratory for Class I, Group D conditions.

Motor is a completely self-contained tubular unit that can be removed from the pumping line without being disassembled. An extruded aluminum outer shell channels the fuel and serves as an exceptionally rigid structural member. Unit is designed for maximum liquid passage area with minimum restrictions to liquid flow.

No adaptors are needed to mount the motor to the supply pipe and conduit. The motor housing fits the radially split impeller housing found on most conventional centrifugal pumps.

Leland Electric Company, division of American Machine & Foundry Company.

(166) Protection in Hazardous Atmosphere

Three 350-hp, totally enclosed, inert gas-filled motors at the Baltimore Refinery of the Esso Standard Oil Company have been put into operation driving hydrogen compressors. The motors were designed and built by Electric Machinery Manufacturing for maximum protection against explosion of hydrogen due to sparking.

Each of the motors is built with a practically gas-tight enclosure. This enclosure is made as gas-tight as possible by the following precautions:

1. "Blind" holes are used where bolts enter the outside of the enclosure. (Bolt holes are drilled and tapped in the heavy steel frame, without going entirely through the metal.)
2. A machined "surface fit" where the bearing brackets attach to the motor housing eliminates need for gaskets.
3. Gas-tight, continuous welds are used throughout during the fabrication.
4. Oil-pressure gas seals in the bearings make the bearings practically gas tight. The seals are virtually non-wearing and require no more attention than long-life sleeve bearings.

Inert gas is maintained inside the enclosure at a slight positive pressure so that the slight leakage of gas through the motor is of inert gas going out instead of explosive gas going in.

Motors are cooled by circulation of the inert gas. Gas-to-water coolers are mounted near the top of the enclosure.

Sleeve bearings are flood lubricated (a combination of forced-feed and oil ring methods). With oil rings furnished, the motor could operate indefinitely after failure of the pressure oil supply, without damage to bearings.

A high degree of protection for these motors is provided by special instruments and controls that permit the operator to check the functioning of the motor at a glance. Standard safety features include: (1) Inert gas pressure

At Jerguson you get a

Complete Line

of Liquid Level Gages, Valves and Specialties

Working closely with the men in the field, Jerguson has developed a complete line of specialized gages, valves and other equipment to meet the specific needs of the chemical and petrochemical industries for the observation of liquids and levels. Available in stainless, monel, nickel, hastelloy and many other materials . . . with rubber, neoprene, lead, teflon, Kel-F, and other linings . . . in a variety of end, side or back connections.

Reflex and Transparent. With a variety of valves for all installations.

Large Chamber Gages. Minimize boiling and surging effect. Both Reflex and Transparent; also with non-frosting gage glass extension.

Heated and Cooled Gages and Valves. Complete line of heated and cooled gages and valves, in various models, both Reflex and Transparent.

Non-Frosting Gages. Patented design prevents frost building up over vision slot.

Welding Pad Gages. Weld right to liquid containing structure and become an integral part of it. Can be staggered for continuous visibility.

Illuminators. Explosion-proof construction, UL approved.

Group G Instrument Piping Valves. Unions, nipples, reducers, elbows, tees, valve and bleed valve all combined in one space-saving unit.

Write for Data on Jerguson Products for Chemical and Petrochemical Processing.

JERGUSON

Gages and Valves for the Observation of Liquids and Levels

JERGUSON GAGE & VALVE COMPANY
100 Fellsway, Somerville 45, Mass.
Offices in Major Cities
Jerguson Trent Gage & Valve Co., Ltd., London, Eng.
Pétrole Service, Paris, France

and temperature gages, and relays with alarms and/or shutdown contacts; (2) rotating-type indicators for oil feed to bearings; (3) oil-level sight gages on oil reservoir and bearing housing; (4) purging valves for start-up.

Optional features on these motors include: (1) Water cooler with double-tube construction :(2) liquid-level detector switch; (3) bearing temperature relays; (4) water flow indicator; (5) special explosion-proof potheads, condulets, etc.

Electric Machinery Manufacturing Company.

Fire-Safety

(169) Trailer-Mounted Fire Pump

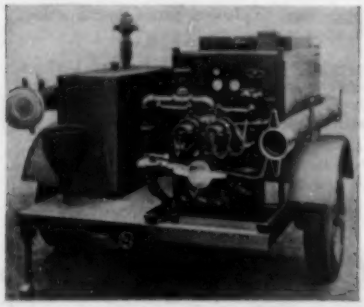
A trailer-mounted fire pump and combination foam unit that can be moved by manpower alone, when necessary, has been developed by National Foam System.

The trailer has a storage tank for 100 gal of Aer-O-Foam Liquid, sufficient to produce 33,000 gal of foam. A trailer hitch is provided permitting the unit to be moved easily and rapidly by vehicles of many types.

Designed to produce foam for fighting flammable liquid fires around docks and piers where water is available only from draft, the unit can produce high-pressure streams of water instead of foam.

According to the manufacturer, this fire pump is used to produce foam solution for operating foam nozzles, foam towers, or foam chambers with capacities up to 480 gpm (4800 gpm of foam). The unit may also be used to boost water pressures from hydrants for high-pressure water streams. There is an additional use as an emergency water pump for purposes other than fire-fighting.

In emergencies where water lines have been disrupted, the unit will relay water from draft to the pump suction



connections of a foam truck or water pumper, at volumes up to 800 gpm.

The manufacturer provides optional equipment including a pump of higher capacity, road lights, and a throttling valve for use when pumping from hydrants with some residual pressure.

National Foam System, Inc.

(170) Self-Powered Fire Alarm

Development of new self-powered and explosion-proof signaling horn designed for use in chemical and petrochemical plants, petroleum refineries, and gas transmission stations has been announced by Falcon Alarm.

This portable horn has an open-air audible range of more than 1000 ft on industrial sites and can be heard more than 150 ft above the average plant's ambient noise level.

The "Dual-Tone Signal Horn" creates a sound ranging from 116 to 120 decibels and will blow continuously for more than a half hour or sound a minimum of 500 five-second warning blasts without recharging.

Unit is powered by Du Pont's non-deteriorating and non-toxic Freon and provides signals for any industrial application despite possible electric power failures.

Falcon's dual-tone horn consists of a standard 10-lb cylinder of Du Pont's harmless Freon 12 topped by two Falcon-engineered horns of slightly different pitch. Operation is controlled either by a toggle valve or remote-type lanyard.

Horns and control valves on the new Falcon signal device are protected by rigid steel guards and carrying handles. Gross weight, when filled with Freon, is approximately 25 lbs. Horn measures 20 in. high and has an outside diameter of 12 in.

Falcon Alarm Company.

Lab. Equipment

(172) Digital Flow-Indicator Packaged System

Packaged in one compact unit, the first complete digital flow-indicator system, designed by Berkeley division of Beckman Instruments, now is in production.

Berkeley systems engineers especially tailored their new Model 5692 Digital Flow Indicator to fill the need for a production testing instrument compact enough to move from test bench to test bench for calibrating flow meters and making actual flow measurements.

Utilizing the circuitry of the new Berkeley 7000 Series, the system combines the features of Berkeley's 7150 Eput Meter and 5424 Preset Counter to create a highly accurate digital instrument for measuring fuel flows.

Its unique front panel features a four-digit presentation reading directly in either pounds per hour or gallons. Direct flow rate indication runs from zero to 9999 lb per hour. The time base may be selected from 1 millisecond to 10 sec, in increments of 1 millisecond.

The front panel also contains a function selector switch and four selector switches for selecting the proper time base.

Unit includes complete test and flow totalizing qualities, and is engineered to operate with any impeller-type transducers now on the market. It can be easily modified for use with two or more different transducers.

A complete test feature checks the entire operation and indicates on the four banks of decimal counting units the actual time base chosen. Any discrepancy between this indication and the preset counter number immediately reveals any malfunction of the system.

Accuracy is $\pm$ 1 count, and time base stability is one part in 10^6 short term. Sensitivity is 5 millivolts at 5 cps.

Binary-decimal coded output from the decimal counting units will operate any standard digital recorder, inline converter and readout unit, or data reduction equipment.

Berkeley division, Beckman Instruments, Inc.

(173) Differential Refractometer

The new Meeco-Matic Model II Recording Differential Refractometer for continuous analysis of binary-liquid streams has been developed by the DuPont Company and is available from Manufacturers Engineering & Equipment.

Instrument is designed for plant operation and features rugged construction, ease of installation and maintenance, temperature compensation, and sensitivity 10 times higher than that of present laboratory-type refractometers. Full-scale span of the instrument is adjustable from 10^{-1} to 4×10^{-4} refractive index units. The minimum detectable change in refractive index is 1 per cent of full scale at any span.

This differential refractometer is useful for determining the composition of two-component liquid streams, such as may be found in distillation, extraction and washing, filtration, and crystallization operations. The concentration of both gases and solids in solution can be determined by the refractometer.

The Meeco-Matic Model II Differential Refractometer can sometimes be used where instruments measuring other physical properties cannot be successfully applied. An infrared an-

alyzer, for example, is not aplicable on liquid samples whose dominant constituent is water, because of the intense absorption characteristics of water in the infra-red. Mass density of a sample may change only slightly with a change in composition, whereas that same sample may undergo a large change in refractive index for the same change in concentration, making the latter measurement much more practical.

Operating at its highest sensitivity, the new Meeco-Matic Model II Differential Refractometer can achieve the following full-scale spans:

Mixture	*Full Scale Wt. Per Cent*
Acetic acid in water	1.0
Acetone in water	2.0
Ethanol in water	1.5
Methanol in water	20.0
Phenol in water	2.5
Sulfuric acid in water	0.5

Manufacturers Engineering and Equipment Corporation.

(175) Petroleum Products Distilled Automatically

Precision Scientific has redesigned the Automatic Distillation Apparatus, which eliminates the tedium of repetitive testing chores in controlling the quality of refinery output.

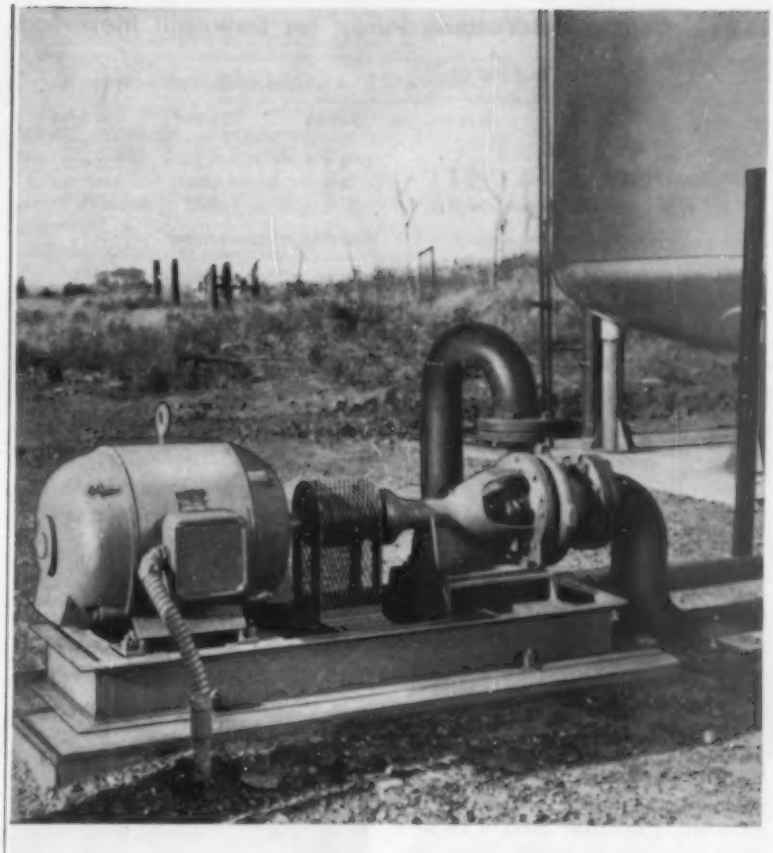
Specifically designed for distilling gasoline, kerosine, naphtha, and similar petroleum products according to ASTM D 86, the ADA also distills fuel oils, plant spray oils, diesel and farm tractor fuels, benzene toluene, esters, lacquer solvents and thinners, turpentine, crude petroleum, and many other products.

The entire distillation — after the charged flask and chart are in place and the initial heat selected — is automatic. Initial boiling point time distillation rate changes, plotting of the distillation curve, and shutting off are performed without additional operator attention. Distillation curves are more accurate than manually plotted curves, since operators no longer need to make time checks, or read thermometers and graduates.

Automatic operation permits use of unskilled personnel for routine distilations, releasing valuable technicians for more timportant duties. One man can operate as many as 8 ADA's simultaneously.

Accuracy of the ADA is even closer than the tolerances allowed by ASTM — temperature to ±0.75 F, volume to ±0.075ml. Repeatability, too, is better — standard deviation between runs, ± 1.085 F. Two distillation rates are available — one at the ASTM-specified 4.5 ml per minute, the other at 9.0 ml per minute.

Precision Scientific Company.



A Centrifugal Pump Salt Water Can't Damage!

Ampco Pumps are ideal for salt-water disposal and flooding operations:

- *Transfer service*
- *Pumping over aerators*
- *Pumping through filters*
- *Back-flushing filters*
- *Delivery of treated water*

It's an AMPCO . . . made from aluminum bronze that contains no zinc.

Ampco Pumps resist corrosion, erosion, abrasion, cavitation-pitting, and dezincification. They are made from Ampco alloys engineered specifically to resist salt water corrosion.

Durability isn't the only advantage of Ampco Pumps. They have high efficiency . . . up to 85%. You pay considerably less for power.

Ampco Pumps are available in more than 100 different combinations, with speeds from 1750 to 3500 rpm; capacities to 600 gpm; heads to 300 feet.

Contact us in Milwaukee for the name of your nearest AMPCO PUMP DISTRIBUTOR.

AMPCO®

AMPCO METAL, INC.

Dept. PE-7, Milwaukee 46, Wis. • West Coast Plant: Burbank, Calif.

THE METAL WITHOUT AN EQUAL

P-23

(171) Controlled-Volume Pump for Downhill Metering

Pump size	Capacity ml/cycle	Capacity in GPH* at indicated speeds, in cycles per minute			
		10 cycles	15 cycles	20 cycles	25 cycles
ΔP^1	3.15	.5	.8	1	1.3
ΔP^2	15.78	2.5	3.8	5	6.3
ΔP^3	78.90	12.5	18.8	25	31.3
ΔP^4	394.50	62.5	93.8	125	156.3
		Differential pressures required			
		10 psi	20 psi	35 psi	50 psi

The —△P (Minus Delta P) controlled volume pump recently developed by Milton Roy is a positive displacement meter for downhill pumping of liquids or gases.

Its compact size and simple construction easily adapt it to any low-capacity, flow control problem where suction pressure is at least 10 psi greater than discharge pressure. Basic leakproof design and a variety of construction materials make it particularly adaptable to handle dangerous or highly corrosive fluids.

This pump with stroke length adjustment comprises three units: a pump chamber divided into three parts by two slack diaphragms, a four-way valve connected to the outer pump chambers, and a stroke length adjustment reservoir connected to the inner pump chamber.

In operation, the four-way valve alternately admits fluid to each side of the diaphragm pumping chamber. As the fluid enters the metering chamber on one side of the diaphragm, it simultaneously pushes fluid from the opposite side. The displaced fluid discharges to the point of application.

Pump capacity can be adjusted in two ways. (1) by varying the cycle time of the four-way valve by using solenoid activation with a timer or other electric contactor; or (2) by means of an optional pump chamber volume changer.

The —△P pump has many applications, such as additive injection systems, leakproof metering systems, and fluid sampling systems. In fluid sampling, a flow meter can be used with an integrator set to emit an impulse for a fixed throughput in the flowline. This impulse reverses the four-way valve and a sample is discharged to a sample storage bottle. In this manner, continuous average samples can be taken.

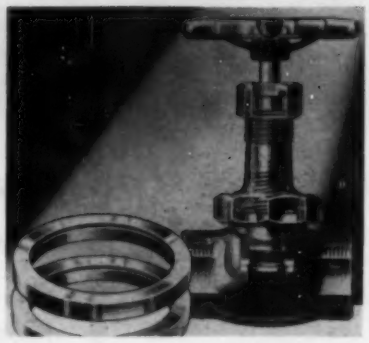
System is equally effective on any stream carrying clear fluids, whether liquid or gas.

Milton Roy Company.

Valves

(176) Rating Increased on Throttling Globe Valve Line

A new line of LQ600-200 bronze globe valves, rated at 200 lb steam pressure and at 400 lb water, oil and gas pressure, has been announced by



Lunkenheimer. New classification marks another important advancement in the valve industry.

Addition of this valve line answers the need for a higher-pressure, throttling globe valve in sizes ¼ to 2 in. Wear and corrosion-resistance characteristics are identical with those established by the original LQ600 bronze valve which, following five years of industry-wide tests, is claimed as the most advanced valve development.

Design and construction features of both LQ600 lines are identical. The bodies and bonnets of the new valves, however, are made of Lunkenheimer S-1 bronze. S-1 bronze is exceptionally close-grained, and features high density, strength and corrosion-resistance. It has since been adopted as ASTM B-61 and Navy M. It makes possible the production of higher-pressure valve, and greatly extends the range of applications where this bronze valve can be specified.

Featured is a new alloy seating metal developed by Lunkenheimer and now universally known as "Brinalloy," and the flat-seat design of the valves. Seats and discs are lapped to obtain a micro-optically smooth, flat, leak-proof seal. These perfectly flat surfaces are integral parts of the disc and body and do not need regrinding or replacement.

Other features include the exclusive Lunkenheimer "Stemalloy" stem, which minimizes thread wear; deep packing nut for firm thread engagement, and back seats which facilitate repacking while the valve is wide open.

Lunkenheimer Company.

(177) Improved Diaphragm Control Valve

An improved diaphragm control valve is being manufactured by Fisher Governor in direct acting (Series 657) or reverse acting (Series 667) units. They have a bolted type stem connection which allows stem adjustment of 50 per cent of total travel in either direction, which will not shake loose from vibration or rotational inner valve forces.

Diaphragm casings are of drawn steel, the yoke of high-tensile cast iron. Yoke to body connection is by a forged steel hammer lug nut. The topwork can be removed without disturbing the stuffing box. The stuffing box is the bolted clamp type with Teflon packing.

Specially designed Buna N, molded diaphragms with nylon insert are able to retain superior flexibility at low ambient operating temperatures. These diaphragms also provide linearity between operating pressure signal and travel, and give maximum effective area.

Fisher Governor Company.

(174) Synthetic for Fluid Seals

Disogrin, a new diisocyanate polyester elastomer produced by Greer Industries, offers unusually high tensile strength, extreme abrasion resistance characteristics, long life, as well as resistance to high ozone concentrations, oil and jet fuels, and radioactivity.

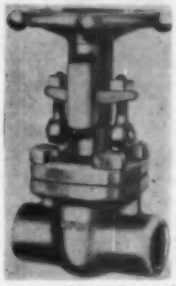
Initially, Disogrin is likely to find its widest application for general use in the hydraulics and mechanical fields.

Products that now incorporate Disogrin include: accumulator bladders, gears, bellows, U-cups, molded diaphragms, and valve seals.

Greer Hydraulics, Inc.

(178) Less Weight, Longer Life Typify New Valves

The RP&C valve division of American Chain & Cable has announced that it has completely redesigned its line of forged-steel gate valves for the petrochemical and process piping industries. Valve sizes range from ¼-in. to 2-in., with either screwed or welded ends.



Major improvements include stainless steel eyebolts, stainless steel nuts, sturdier gland, stainless steel follower, redesigned stuffing box, and a smoother operating stem that cannot damage the packing during the assembly of the valve. The combination of a 500 BHN heat-treated, stainless steel wedge with stainless seat rings, hard-chrome plated, is designed to resist seizing and galling, as well as abrasive wear.

Stuffing box packing consists of molded asbestos, wire reinforced and mica lubricated — reducing the possibility of pitting of the stainless steel stem. Rolled stem threads are said to be 30 per cent stronger than cut threads and heat treated to a Brinell hardness of 375. The Flexitallic spiral-wound gasket gives a positive, tight joint and is generally reusable in normal service. Entire line of valves is lighter yet stronger.

American Chain & Cable Company, Inc.

(179) Positive Shutoff Valve for Oxygen Service

Through greater use and selection of special synthetic materials, Orbit valves are being developed for use in oxygen installations. Their forged steel construction and non-lubrication features make them especially safe and desirable for handling oxygen.

Oxygen will react with many organic compounds, usually with the evolution of heat, and unless these reactions are properly controlled violent results may occur.

A special stem packing has been developed for oxygen use. This packing is designated FL Plastic Packing and contains a shredded Teflon base compounded with a small quantity of lubricant which is inert to the effects of oxygen. The valve is degreased and specifically prepared at the factory for oxygen service.

All Orbit valves use a resilient body seat. These seats are deflected in the closed position a sufficient amount to assure a seal. Seat materials for oxygen service are special and are designed so that metal to metal sealing is also provided.

Orbit valves are also used for handling such chemicals as hydrogen, dry chlorine, nitrogen, ammonia, LPG, petroleum solvents and other related hydrocarbons.

Orbit valves are available in a full opening or venturi pattern. The full opening sizes include 1 in. through 4 in., while the venturi pattern is offered in 2 in. through 6 in. The valve is made in ASA 150 through ASA 2500 lb class. Orbit valves have a temperature rating of 250 F.

Orbit Valve Company.

(180) 600-Lb Valves With Latest Internal Streamlining

Improved internal streamlining, which lessens wear and reduces pressure drop, is featured in the new redesigned 600-lb line of Rockwell-built Edward globe and angle stop, check and non-return cast steel valves now being built and sold by Edward Valves.

Features formerly available only in Edward 900-lb, 1500-lb, and 2500-lb valves, are now incorporated into the new 600-lb valves to insure easier operation and cut down maintenance requirements. Included among these are swivel disk construction, stellite-faced disks guided the full length of travel using integrally cast guide ribs, integral stellited seats and the Impactor handwheel, which is said to be three times as effective as ordinary handwheels.

In addition to these advantages, Edward 600-lb valves in sizes of 8 in. and larger also feature the new improved Pressure-Seal bonnet joint, which gives twice as much sealing force and three times as much sealing area. This Pressure-Seal design, which is standard in all Edward stop, check and non-return valves of 900 psi and over, offers such important advantages as the elimination of leakage, easy disassembly, lasting bonnet joint tightness regardless of temperature, and low maintenance due to the fact that there are no flanges or bolting to periodically restress.

Edward Valves, Inc., subsidiary of Rockwell Manufacturing Company.

General Equipment

(181) Deep-Corrugated Aluminum Jacketing

A deep-corrugated aluminum jacketing for tanks, towers, and vessels has been introduced by Childers Manufacturing.

Childers introduced corrugated aluminum pipe jacketing eight years ago, which reportedly cut jacketing costs up to one-third. The addition of

deep-corrugated jacketing for tanks, towers, and vessels, now makes it possible to do an all-aluminum jacketing job on any installation. Appearance is improved, and installation costs are cut because of lower first cost and ease of cutting and handling. Childers aluminum jacketing may be attached with aluminum strapping and seals, or with aluminum sheet metal screws.

Deep Corrugated Jacketing is available with 1¼ in. or 2½ in. corrugations. Rigidity is increased by cross crimping the aluminum before adding the deep corrugations. Cross crimping adds up to 97 per cent greater strength over plain corrugated aluminum.

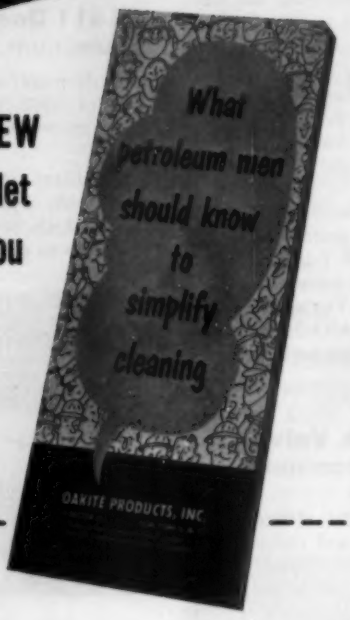
A new factory-applied moisture barrier, added to Childers corrugated jacketing, has been developed to completely eliminate corrosion of the jacketing, providing a virtually permanent jacketing job. Childers jacketing with moisture barrier also eliminates a costly step in pipe and tank jacketing. The 15-lb felt wrapping, formerly used in most installations, is no longer necessary.

Moisture-barrier process took more than three years to develop. Two years ago, a tough paper was found that would stand the more than 30,000 lb of pressure in the corrugating press. It wasn't until last year that an adhesive was discovered that would hold the water-resistant paper barrier to the sheet aluminum during processing.

Childers Manufacturing Company.

ONE IDEA

from this NEW Oakite Booklet may save you many a cleaning dollar



Here, in 48 fact-filled pages, you'll find helpful information on job-tested cleaning methods covering a wide range of maintenance, overhaul and repair work in all divisions of the petroleum industry. Just one idea may save you many a cleaning dollar on such jobs as:

- Descaling heat exchangers
- Cleaning filter screens
- Washing fuel oil trucks
- Salvage cleaning
- Steam-detergent cleaning
- Paint stripping drums, barrels, storage tanks
- Cleaning tank car interiors
- Cleaning stabilizing, fractionating, absorption towers

Illustrated booklet yours FREE for the asking. Send for your copy TODAY. Oakite Products, Inc., 50B Rector Street, New York 6, New York.

SPECIALIZED INDUSTRIAL CLEANING

OAKITE

MATERIALS • METHODS • SERVICE

Technical Service Representatives in Principal Cities of U. S. & Canada

IN-BUILT SIMPLICITY...

GUARANTEES

LONG, TROUBLE-FREE SERVICE

Here's the simplest and most efficient pump valve made for reciprocating pumps. The ROYAL CROWN PUMP VALVE has only three separate parts, yet its performance is revolutionary! Valve is guided by a frictionless ball stem which allows it to oscillate and turn with the fluid stream. Swings completely free with each stroke of the pump . . . seating each time in a new position. Resistance to fluid is reduced to a minimum which means greater pump volume at less pump speed. Adaptable to all reciprocating pumps . . . handles all types of liquids.

Royal Crown PUMP VALVES

(A) Round valve surface is streamlined. No obstructions to restrict the flow. (B) Ball-guided valve rotates and swings with each stroke of the pump. Each turn, each swing . . . a lapping action, a continuing perfect seat. (C) Free vertical action assures instant opening and closing. Ball stem is a frictionless guide.

MADSEN WORK// CONSTRUCTION EQUIPMENT DIVISION
Baldwin-Lima-Hamilton Corporation

WRITE FOR DESCRIPTIVE LITERATURE

14120 EAST ROSECRANS AVE., P. O. BOX 38, LA MIRADA, CALIFORNIA

Immediate Delivery!

NEW MODEL Series 53 CURTIN CENTRIFUGES

with 7 improvements

Aluminum castings reduce weight one-third to approximately 5-1/4 lbs. . . . Diameter of drive shaft increased from 7/16" to 1/2" for added strength . . . Gear train redesigned for more efficient operation . . . Both 15 cc and 100 cc sizes use the same crank . . . Spindle shaft ball bearing mounted, easier to turn . . . Drive shaft of corrosion resistant stainless steel . . . Spindle of corrosion resistant stainless steel.

Write for bulletin 53

W. H. CURTIN & CO.

DOMESTIC EXPORT • CURTIN LABORATORY APPARATUS, FURNITURE & CHEMICALS

Houston – New Orleans – Tulsa – Birmingham – Corpus Christi
Subsidiaries: Atlantic Scientific Corp., Orlando, Florida
Curtin de Mexico, S. A. de C. V., Mexico City

Established 1922 U.S.A.

(119) Engine Powers Hydraulic Ram

Templeton, Kenly & Company now has available a powerful, lightweight, gasoline-operated hydraulic pump for use with all single or two-way Simplex "Re-Mo-Trol" hydraulic rams.

The power pump with a displacement of 30 cu in. of oil per minute will raise a ram five times faster than a hand pump with a displacement of 6 cu in. of oil per minute. For example, a 60-ton capacity ram is raised 1 in. in half a minute with a gasoline pump compared to 1 in. in 2 min with a hand pump. Thus, to the labor-saving efficiency of hydraulic jacks and pullers is added time-saving operating speed.

This new pump unit, known as the No. 798 GM, has a 1½ hp gasoline engine that provides continuous operating pressure of 5000 psi and intermittent pressure up to 10,000 psi. When used with Simplex "Re-Mo-Trol" rams, the No. 798 GM provides combination units with capacities from 10 to 600 tons for lifting and moving heavy loads. The set-up exerts lifting, pushing, or pulling force in any direction, while the operator remains a safe distance away. It can be used to lift and lower machinery, align beams, straighten buckets and forms, prestress concrete — has any number of applications in industrial and construction fields.

Templeton, Kenly & Company.

(266) Centrifugal Gas Cleaners (Scrubbers)

Until eight years ago, removal of solid particles and liquids from compressed air or gas streams could be accomplished only by liquid-type scrubbers in which the particles were entrained in an oil spray, and then removed with the contaminated oil. This necessitates settling chambers to allow the dust to separate from the oil, so that the fluid can be reused.

The Aerotec centrifugal cleaner is a completely dry-type unit using small-diameter tubes or cyclones singly or in parallel, depending upon the volume of gas or air to be cleaned.

For more information on this Equipment see page E-20a

Entering dirty gas is whirled into the tubes by appropriately designed inlets, and the dirt and foreign material are precipitated into a dust chamber or hopper while the clean gas goes out either the top or side of the vessel. All foreign material is collected in its natural state, that is, without any additive, and can be removed from the bottom of the cleaner for salvage or recycling if desired.

Efficiencies are claimed to be extremely high for mechanical-type collectors with practically all the foreign particles above 8 microns in size being removed from the gas stream.

Advantages of this type cleaner are that it completely eliminates the carry-over of mists, ordinarily associated with liquid-type scrubbers; it removes both liquids and dusts; it is not subject to overloading because generally the higher the load, the higher the efficiency; and as mentioned previously, there is no contamination of the product collected.

The collecting tubes can be fabricated from any desired material, which can be a great advantage in the petroleum and chemical industry. Materials that have been used in the past include carbon steel, stainless steel, plastic, and rubber.

The Thermix Corporation.

The Petroleum Industry's Oldest Engineering Publication

That is The Petroleum Engineer, read and relied upon by operating men throughout the U. S. and sixty-seven foreign countries for twenty-five years . . . the same publication which has recently undergone changes in line with twenty-five years of industry progress . . the most practical and progressive re-modeling job conceivable, to fill the needs of operating men engaged in each division of the industry.

Scan carefully the copy in your hands, noting the calibre and "personal assistance" value of its contents. It brings you monthly coverage of operations, news, personals and pictorials nearest your interest, in addition to world petroleum developments and news . . . to *provide you a publication of 100% practical value.*

USE THE ENCLOSED CARD to Start Your Personal Copy Today

The Petroleum Engineer
P. O. Box 1589 Dallas 1, Texas

PUMP
Liquids • Gases • Slurries
WITHOUT CORROSION OR CONTAMINATION

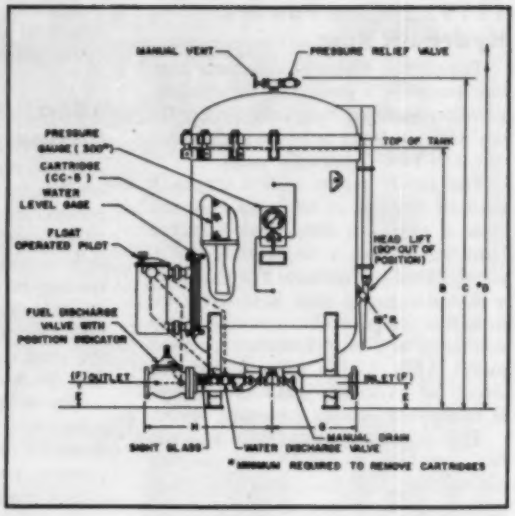
Prices range from.....$55 to $500
depending on size of pump and accessory equipment required.

Write for Catalog
SIGMAMOTOR Inc.
36 NORTH MAIN STREET MIDDLEPORT, N. Y.

SEPARATOR / FILTER DIMENSIONS

*GPM Rating— Model No.—	100 GPM FCS-105ANW	200 GPM FCS-245ANW	300 GPM FCS-365ANW	400 GPM FCS-485ANW	500 GPM FCS-605ANW	600 GPM FCS-665ANW
DIM A	20	30	36	42	42	42⅝
DIM B	60	63	64½	70	70	70
DIM C	74	80	83	91	91	91
DIM D	82	85	86½	92	92	92
DIM E	6	6	6	7½	7½	7½
DIM F	2	3	4	6	6	6
DIM G	12	15	18	21	21	21
DIM H	23	26	31½	38	38	38
DIM J	5⅛	9⅛	11⅞	13½	13½	13⅜
DIM K	11¼	18¼	22⅝	27	27	27½
DIM L	14	19	22	25	25	25⅝
No. of Cartridges	10	24	36	48	60	66

*JP-4 FUEL



(185) Separator-Filter for Fuels

Warner Lewis has developed a vertical separator-filter for removal of water and solids from liquid fuels. Equipment is now being applied on government installations, and meets prevailing military specifications. Major oil companies and other commercial customers are purchasing units for application on bulk fuel terminals, refineries, and similar locations where top efficiency in removal of water and solids from fuel is of importance. Majority of applications to date have been on locations where aviation fuels are in use, which include kerosine, JP-3, and JP-4.

The Fram-Warner Lewis vertical separator-filter has features to simplify maintenance, including a swing bolt cover with mechanical lifting jack, and for ease of cartridge removal, unit uses screw-base cartridges. Equipment may be designed for any code or pressure requirement. Suggested fuels that equipment handles include JP-3, JP-4, JP-5, aviation gasoline, kerosine, diesel fuel, No. 2 fuel, solvents, and aromatics.

Water separation and filtration are accomplished in one pass through specially treated Fiberglas cartridges with synthetic fiber sock. Equipment is capable of filtering out solids down to five microns and coalescing any water contained in fuel. Water collects in the bottom of the vessel. This proved design assures water separation to 99.95 per cent of inlet water content. Automatic controls are available to remove water collected.

Warner Lewis Company.

(182) Wear and Tear on Vessel Liners Reduced by Armor-Retainer Grid

Damage to vessel walls from catalytic bombardment can be controlled with "Gridsteel Contour Retainer Mesh," a new low-cost steel mesh retainer and armor now being manufactured by Irving Subway Grating.

Gridsteel Mesh is generally used for interiors of catalytic regenerators, reactors, gas stacks, cyclones, and so on. It is welded to the inside of steel shells, and ganister or castable refractory material is gunned into the meshes. Thus the ganister is securely anchored

to the inside of the shells and at the same time the surface of the ganister lining is armored to prevent erosion. In addition, any crack that might develop in the castable material is restricted to a single mesh of the retainer. It cannot spread beyond the surrounding steel.

Gridsteel mesh is made of steel bars on edge, fastened together in an overall hexagonal pattern. A special loose clinch is used in manufacturing the product when it is to be used on curved surfaces. The loose clinch allows the mesh to take the contour of vessels, with ease.

Mesh is available for quick delivery in standard steel panels, 3 ft by 10 ft. Normally, bar thicknesses are 14 gage or 12 gage steel by ¾ in. or 1 in. depth. Hexagonal openings are 1⅞ in. between bar faces.

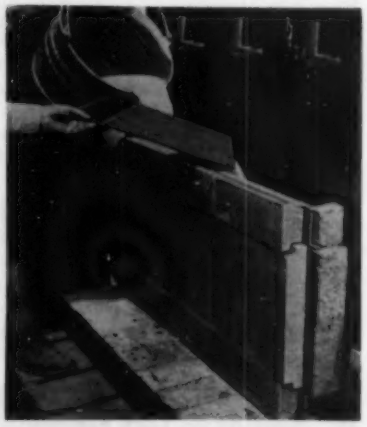
Irving Subway Grating Co., Inc.

(183) Refractory Liner for Steel Cased Furnaces

The problem of providing a refractory liner for steel cased units is neatly solved with the new Thermolayer Construction. This construction is unique in that it can be applied to units with any contour—flat, curved, angular or conical.

The layers of insulation and refractory are held in place by specially designed studs that are welded onto the steel casing. It is a simple and speedy application that results in a liner with low heat loss.

Refractory tile is used to face the inside of the furnace and this tile can be varied in quality to meet the operating conditions of the unit. The layer construction permits the selection of



proper materials for each of the three functions—refractory for resistance to heat and abrasion, a poured castable for sealing the unit, and block insulation to stop heat loss.

M. H. Detrick Company.

(184) New Thin Cementable Teflon Tape Developed

Garlock Packing announced the availability of cementable Teflon tape in thickness as low as .005 in. Heretofore cementable Teflon has been limited to thickness of 1/16 in. and up. The thinner tape, lower in cost, will expand the use of Teflon as linings for conveyor guide rails, hoppers, baking pans, and other work surfaces handling corrosive materials, etc.

Non-toxic, non-contaminating, chemically-impervious Teflon tape is furnished with a slippery surface on one side and a specially prepared surface on the other side that can be bonded with commercial adhesives to wood, glass, metal and other surfaces.

In addition to its anti-sticking surface characteristics, Teflon possesses excellent dielectric properties, and a broad service temperature range (–110 F to 500 F). The new cementable Teflon tape is available in continuous rolls in thicknesses from .005 in. to .060 in. in width from ½ in. to 12 in. Also available are cementable Teflon sheets (24 in. x 24 in. to 48 in. x 48 in.), in thicknesses from 1/32 in. to 1 in. Garlock 201 adhesive is recommended for cementing either the Teflon Tape or Sheet to common substrate materials such as wood, metals, glass or plastics.

The Garlock Packing Company.

(189) Spray Clean for Safety

Cleaning becomes a simple spraying operation with the Oakite Hot Spray Unit.

Unit consists of a 50-gal solution tank, a turbine-type pump operated by a ¾ hp drip-proof motor, spray gun and 25 ft of solution hose, all mounted on a frame fitted with composition wheels.

A mobile cleaning plant, the unit is easy to use. All you do is make up

the recommended detergent solution in the tank, heat it with a steam hose or immersion burner to the desired temperature, flip the switch, and spray the surface to be cleaned. Depending on the amount of soil to be removed, one or two sprayings, a short soaking period, and a thorough rinsing with clear water will finish the job. No auxiliary equipment such as injectors or other apparatus is required.

Unit has many uses, but it is particularly well suited for general maintenance cleaning around the pump house and where soils have not been permitted to accumulate. A Canadian refiner, for instance, is using the unit to clean painted walls and pump bases in crude and cat cracker pump rooms. A detergent with good wetting-out ability is used. All areas are sprayed and allowed to soak for 10 to 15 minutes, then hose rinsed.

Since the use of this unit permits regular cleaning in many areas, it insures better working conditions in several ways. Removal of oil from equipment reduces the fire hazard; removal of oil from floors minimizes injuries caused by slipping and falling; the absence of obnoxious odors and fumes makes cleaning in close quarters safer and more pleasant. The method is economical; detergent solutions so applied are effective at concentrations as low as 2 oz per gallon of water. And the unit cleans up to 12,000 sq ft in half an hour.

Oakite Products, Inc.

(186) New Facilities for Specialized Refinery Fabrication Announced

Fritz W. Glitsch and Sons has announced a new specialty fabrication department for refineries and processing plants. The department will handle the design and fabrication of special kiln internals for cat-cracking units, reactor and regenerator beams and baffles, special piping, welding, steel components, and other equipment that must be engineered for weight and strength ratios or special construction.

The Glitsch plant is known throughout the petroleum and chemical processing industries for its intricate tooling and fabricating of ferrous and nonferrous materials, alloys, and stainless steels.

The firm executes its customers' engineering requirements from the rough sketch stage into anything that is suited to forming, drawing, bending, or welding. The plant has facilities to work metals from heavy plate to sheet metal gage. It has a full complement of machinery and equipment for fabricating and assembling virtually any job shop product.

Fritz W. Glitsch and Sons, Inc.

(188) Hydraulic Steam-Jet Cleaner

This manufacturer of a heavy-duty, all-electric hydraulic jet cleaner has developed a new, smaller unit for medium-duty cleaning applications. Pantex Manufacturing identifies this new model as the Pantex Speedylectric Hydro Steam-Jet Cleaner HYD.

It is available in both stationary and portable models and features both steam-jet and high-pressure hot water

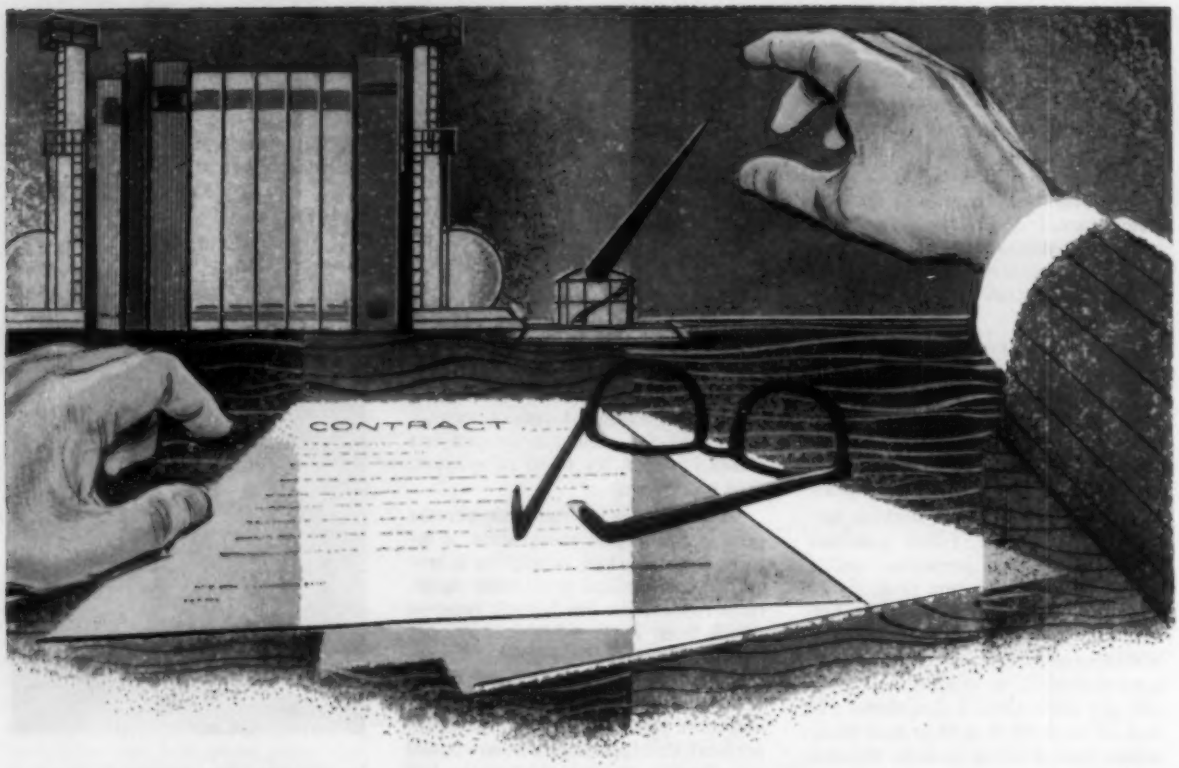
jet cleaning. The source of steam is the Speedylectric Steam Generator, free from flames and smoke, self-regulating, 98½ per cent efficient, simple, silent, and compact.

According to the manufacturer, the built-in hydraulic injector unit provides a solid jet of superheated water and detergent, propelled at high discharge pressure and powerful enough to remove grease deposits and soil encrustrations that defy other cleaning methods. It reaches even inaccessible machinery parts, eliminating downtime and wasted man-hours, and for all heavy-duty plant maintenance performs the fastest clean-up possible.

For delicate parts of machines, motors, and equipment that must be protected from water and excess moisture, the Pantex Speedylectric Steam-Jet provides pin-point cleaning under fingertip control of the operator. The Steam Lance can also be effectively used for applying concentrated, undiluted solvents, detergents or stripping agents, where such chemical aids are needed to soften and loosen accumulations or coatings.

As sparks, flames and fire hazards are completely eliminated, this Hydro Steam-Jet Cleaner is especially adapted to the needs of oil refineries, paint works, chemical plants, truck and fleet garages, and airports. It is available for operation on 220, 440 or 550 volt, three-phase, 60-cycle power supply.

Pantex Manufacturing Corporation.



The easiest way in the world for you to ...avoid turnaround trouble!

All too frequently your need for a turnaround isn't revealed until there's an operational failure. Yet it is so easy to avoid the excessive costs and inconvenience of sudden, unplanned shut-downs.

Simply contract with Procon for a schedule of turnaround maintenance. Then your downtime can be economically planned in advance and one of Procon's experienced turnaround crews will overhaul your unit expertly and get it back on stream in the shortest possible time.

Procon men are specialists on turnarounds. We are doing more of them than any other construction firm. Our experience can provide a time-and-money saving answer to your turnaround problems. We will be glad to give you full information about it any time.

PROCON *Incorporated*
1111 MT. PROSPECT ROAD, DES PLAINES, ILLINOIS, U.S.A.

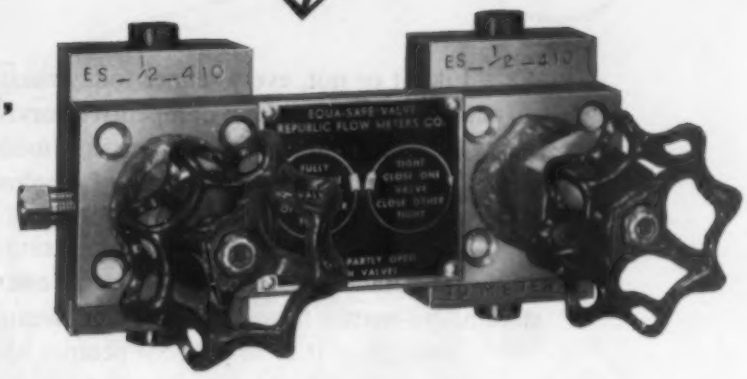
PROCON (*Canada*) LIMITED
TORONTO 18, ONTARIO, CANADA

PROCON (*Great Britain*) LIMITED
LONDON, W. C. 2, ENGLAND

WORLD-WIDE CONSTRUCTION FOR THE PETROLEUM, PETROCHEMICAL, AND CHEMICAL INDUSTRIES

NOW AVAILABLE

Valve Manifolds that STOP Mercury Blowing, Damage to Differential Bellows and Diaphragms



- **CANNOT throw full line pressure across bellows, mercury or diaphragms of ΔP instruments.**
- **Replaces 3 or 4 conventional shut-off valves, fittings, etc.**
- **Rated to 4000 psi (cold)**
- **Available with angle, 3-way or through-type bodies threaded or socket- welded connections.**

No conventional built-up valve manifold affords the protection EQUA-SAFE *automatically* gives to differential pressure type instruments. And no built-up valve manifold can beat the low installation time or low maintenance required by EQUA-SAFE valves.

The "secret" of EQUA-SAFE's protection is in the common bridge-type bonnet and the two double-seating valves it connects. *When either valve is operated* (and sequence does not matter) *pressures in the two chambers of the differential instrument are automatically equalized through the bonnet.* As soon as both valves are fully "opened" (stem out) the instrument is on the line, with no leakage between sides. When both stems are in, the instrument chambers are interconnected and completely sealed off from primary connection pressures. Teflon packings are under pressure only while the stems are traveling from "seat" to "backseat", or vice versa!

Standard EQUA-SAFE valve manifolds are made of carbon and/or stainless steel, depending on your requirements. If your requirements are unusually severe, remember that EQUA-SAFE valves can be made of *any bar stock material that can be machined and welded!* When inspection or maintenance are needed, this bolted-block construction pays off again. EQUA-SAFE valves can be completely dismantled without breaking any pipe connections, and the inlet seat can be dressed up in place. A reversible backseat ring gives double wear, and is merely turned upside down to present a brand new seat.

Get the entire story on what EQUA-SAFE valves can do for your differential instrument installations. Write for Republic Bulletin No. 56-1, or ask your Republic engineer. Now that there is a top-quality instrument valve manifold for ΔP instuments, you should definitely investigate its applications in your plant.

REPUBLIC FLOW METERS CO.
2240 Diversey Parkway, Chicago 47, Illinois

IN THE *Octane Derby*...
no refiner will be happy . . .

Like it or not, every refiner today must look to his octanes. As a matter of competitive survival it is vital that your refining processes provide maximum quality to every gallon of gasoline produced.

Today's, and tomorrow's, increasing demand for higher octane fuels cannot be met by one high octane stream. No matter how good that one stream, there isn't enough of it to bring pool octanes up to required levels; and the higher you raise the quality of that stream the less you'll get.

This is why UOP has consistently devoted much of its research to the over-all development of more practical refining methods, the broad goal of helping you get the most out of every drop of oil that passes through your refinery.

An important result of this work is Universal's latest refining process—PENEX. This new process offers an efficient and practical method of up-grading pentane and hexane fractions, the previously neglected components that can so adversely affect the octane ratings of your pool gasoline.

In the race for higher octanes, you cannot afford to forget that the goal is to improve the general quality of your pool gasolines. PENEX offers a means of accomplishing this practically and economically. It should be given immediate consideration in your planning.

UNIVERSAL OIL PRODUCTS COMPANY

30 ALGONQUIN ROAD,
DES PLAINES, ILLINOIS, U. S. A.

Forty Years Of Leadership In Petroleum Refining Technology

. . way back here

PENEX

TRADEMARK

A new isomerization process for up-grading pentane and hexane fractions

IN ADDITION TO HARSHAW

BORON TRIFLUORIDE
HYDROFLUORIC ACID

anhydrous . . . aqueous

Here are many more production-controlled, high-quality fluorides:

- Ammonium Bifluoride
- Ammonium Fluoborate
- Antimony Trifluoride Sublimed
- Barium Fluoride
- Bismuth Fluoride
- Boron Trifluoride
- Boron Trifluoride Complexes
- Chromium Fluoride
- Copper Fluoborate
- Fluoboric Acid
- Fluorine Cells
- Fluorinating Agents
- Frosting Mixtures
- Hydrofluoric Acid Anhydrous
- Hydrofluoric Acid Aqueous
- Hydrofluosilicic Acid
- Lead Fluoborate
- Metallic Fluoborates
- Potassium Bifluoride
- Potassium Chromium Fluoride
- Potassium Fluoborate
- Potassium Fluoride
- Potassium Titanium Fluoride
- Silico Fluorides
- Sodium Fluoborate
- Tin Fluoborate
- Zinc Fluoborate
- Zinc Fluoride

WRITE FOR

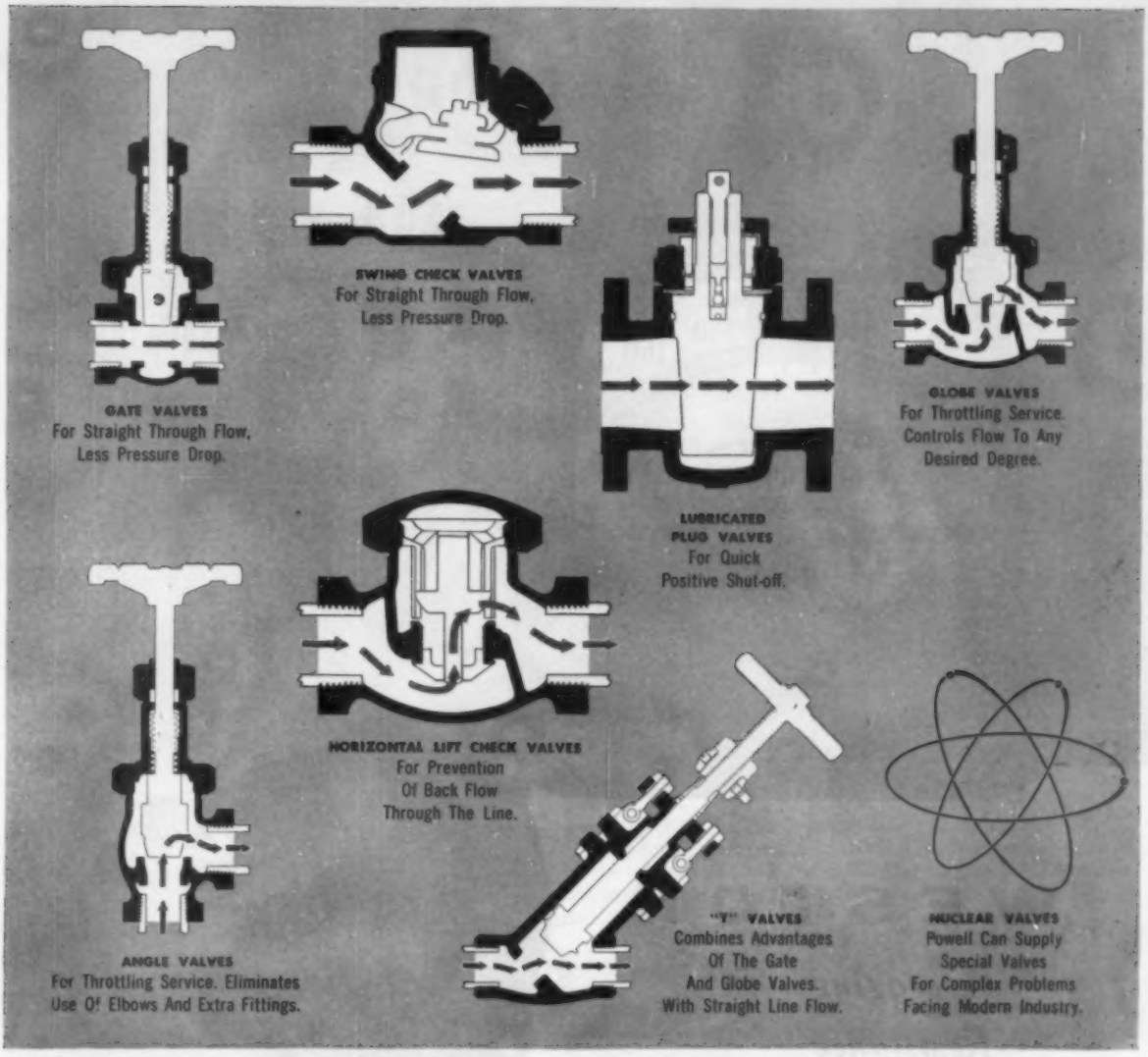
Harshaw's 40-page Book on Hydrofluoric Acid Anhydrous. It provides helpful data.

THE HARSHAW CHEMICAL CO.

1945 East 97th Street • Cleveland 6, Ohio

Chicago • Cincinnati • Cleveland • Detroit • Houston
Los Angeles • Hastings-on-Hudson, N. Y. • Philadelphia
Pittsburgh

POWELL
for all valve needs



for every flow control problem there is a right Valve

Powell can supply this right valve—*made right* of the right material*. Every part of every valve must pass rigid inspection. And as a final step in manufacture, every Powell Valve has *Performance Verified* through an *actual line test*.

As an aid in selecting the right valve, the basic valve designs are illustrated here. For complete information on the wide range of sizes and materials available in each type of the basic valves illustrated above, consult your Powell Valve distributor. If none is located near you—or if you have a special flow control problem—write direct to The Wm. Powell Company, Cincinnati 22, Ohio.

PERFORMANCE
PV
VERIFIED

The Wm. Powell Company, Cincinnati 22, Ohio . . . 110th YEAR

POWELL VALVES

*BRONZE, IRON, STEEL AND CORROSION RESISTANT VALVES.

WESTON

Averaging Resistance Thermometers

Just flick the selector switch to the oil depth, press the button, and instantly read the average temperature of the oil in the tank. *Time-saving* and *money saving* . . . plus on-the-button accuracy. Indicators can be mounted at the base of the tank, or at control points remote from the tank if desired. For multiple tank installations special tank selector panels are supplied. For the complete story on Weston Averaging Thermometers as well as on Weston temperature instruments to indicate, record or control, consult the Weston representative near you, or write direct to WESTON Electrical Instrument Corporation, 614 Frelinghuysen Avenue, Newark 5, N. J. A subsidiary of Daystrom, Incorporated.

THERMOMETERS *by* WESTON

AUTHENTIC
Western Heat Exchanger
CASE HISTORY

CUSTOMER: *Spencer Chemical Company*

WESTERN'S *Speed and Flexibility*

PUTS SPENCER PLANT BACK *ON STREAM*

IN JUST 47 HOURS!

SCHEDULE OF OPERATIONS
MARCH 29-30-31

At Spencer Chemical Company's Jayhawk Works at Galena, Kansas, on March 29, 1956, oil was bled into a compressor air aftercooler, through a valve failure, causing a fire in the shell side of a heat exchanger, completely melting out the admiralty extended surface in the air aftercooler. THIS RESULTED IN A LOSS OF 130 TONS OF NITRIC ACID PER DAY!!

The ability to redesign a prime surface exchanger to handle the heat load originally handled by a special extended surface bundle, and to fabricate from stock materials in thirty hours, emphasizes the importance of Western's speed and flexibility to our Engineering and Operating clientele.

Western merits *your* consideration on present and future heat transfer requirements.

5:40 p.m., Mar. 29

Call from Spencer Kansas City office, requesting retubing of an existing bundle of unusual design.

8:30 p.m., Mar. 29

Following engineering meetings on problem, Western engineer travels to Spencer plant, inspects damage, sketches existing tube sheets and other details affecting bundle fit; returns to Tulsa same night.

7:30 a.m., Mar. 30

Based on heat load, air quantities and flow, new rating is performed, permitting bare tube, prime surface bundle to do job of original specialized extended surface tubes, staying within pressure drop limitations on shell side of unit.

10:00 a.m., Mar. 30

Drafting Department starts on tube sheet layouts, from completely rated unit. Complete bundle drawings in hands of Shop by noon.

12:00 noon, Mar. 30

Stationary tube sheet, fixed tube and baffles drilled on three presses, with crew cutting 600 ¾" x 16 BWG x 20' admiralty tubes to 17' 2" lengths.

9:00 p.m., Mar. 30

Bundle completely assembled, electronic torque controlled rolling of 600 tubes at stationary and floating tube sheets begun. Completed, crated, and shipped by midnight.

4:15 p.m., Mar. 31

Spencer plant back "on stream," having received bundle at 5:30 a.m., completely installed by 10:00 a.m.

WESTERN
HEAT EXCHANGERS

WESTERN SUPPLY COMPANY
P. O. BOX 1888 • TULSA, OKLAHOMA

HUDSON-RUSH COMPANY — 753 Gladstone Blvd., Shreveport, La.
130 Casa Linda Plaza, Dallas, 18, Tex.
P. O. Box 3151, Amarillo, Tex.

PROCESS INSTRUMENTS & EQUIPMENT CO. — North Bldg., Charleston, W. Va.

H. W. SEVERANCE — 2416 Frankfort Ave., Louisville, Ky.

Above the 40th parallel

be sure you

DESIGN FOR WINTER

Everywhere from "The 40th" north your plant is certain to need at least partial cold weather protection—the kind of winterizing Stearns-Roger designed and built into this natural gasoline plant. The customer wanted the best personnel and process protection for severe winters with minimum cost for a turn-key job.

• • • • •

Stearns-Roger engineers are prepared for such assignments anywhere, be it enlargement, modernization, or new facility. For your next Cold Country gasoline plant or refinery project, large or small, arrange now to

take it up with

Stearns-Roger

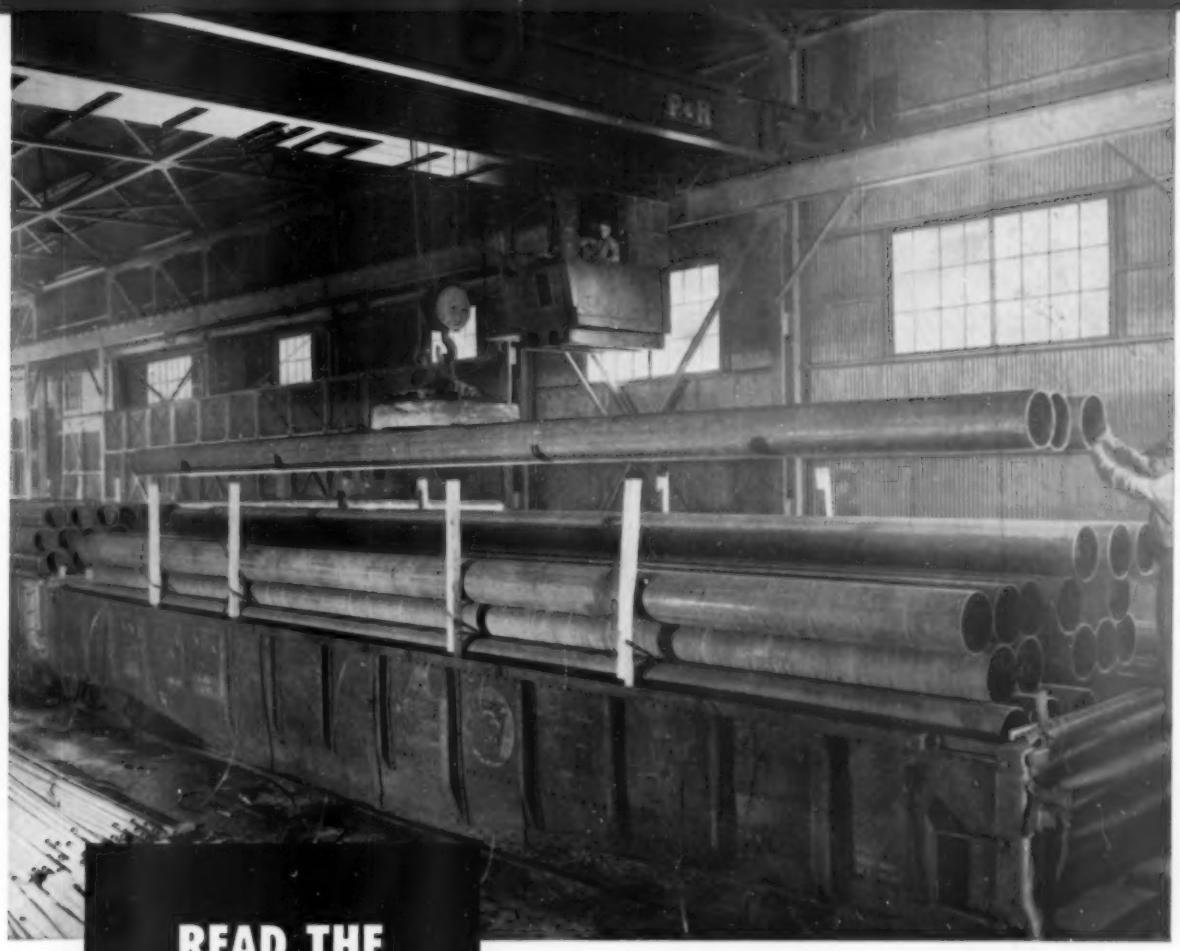
DENVER • SALT LAKE CITY
HOUSTON • EL PASO

STEARNS-ROGER ENGINEERING COMPANY, LTD., CALGARY

Stearns-Roger

THE STEARNS-ROGER MFG. CO. DENVER, COLORADO

ENGINEERING • FABRICATION • CONSTRUCTION • MANUFACTURING



READ THE INSIDE STORY ON PIPE PROTECTION

The great outdoors is no place to coat and wrap pipe. It rains. The weather changes. It's too hot or too cold. It's too wet or it's too dry. That's why the pipe you see above is *indoors*...in a HILL, HUBBELL factory where it will be machine-cleaned, coated and wrapped, under precisely controlled conditions of temperature and processing. HILL, HUBBELL had the know-how to *develop* the factory system of pipe coating and wrapping. Like so many of the forward strides in pipe protection, it is—

Another "first" pioneered by the first name in pipe protection...

HILL, HUBBELL & COMPANY

FACTORY APPLICATORS OF COATINGS & WRAPPINGS

DIVISION OF GENERAL PAINT CORP.

3091 MAYFIELD ROAD, CLEVELAND 18, OHIO

2
x 2
4
Simple arithmetic!
Pumps that deliver *top* performance for *longer* periods of time yield a *bigger* return on the investment. That's what makes GASO Pumps *first in their field.*

SERIES 1800—Light, compact, for crude oil gathering lines and booster stations, water lines, salt water disposal, slush and acidizing service. Fig. 1849: 41 to 113 GPM at 900 to 350 PSI. Fig. 1847: 41 to 143 GPM at 900 to 275 PSI. Fig. 1845: 254 to 370 GPM at 220 to 150 PSI.

GASO PUMP & BURNER MFG. CO.
902 East First Street, Tulsa, Oklahoma
EXPORT OFFICE: **149 Broadway, New York, N. Y.**

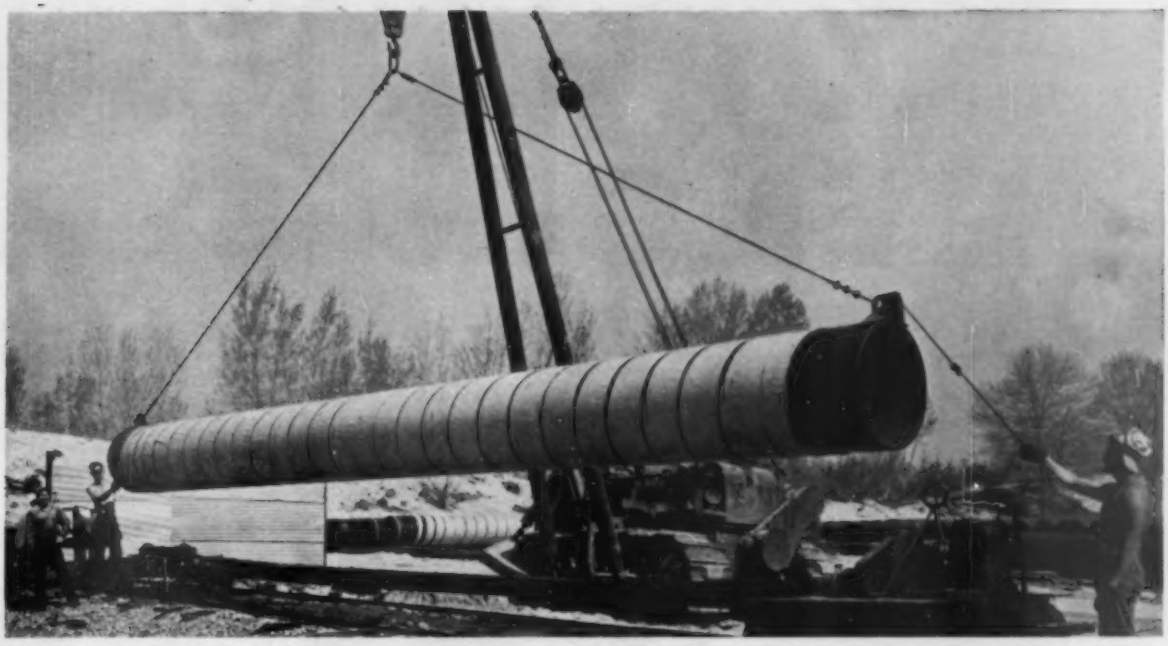
GASO PUMPS
for every oil industry need

FIRST IN THEIR FIELD

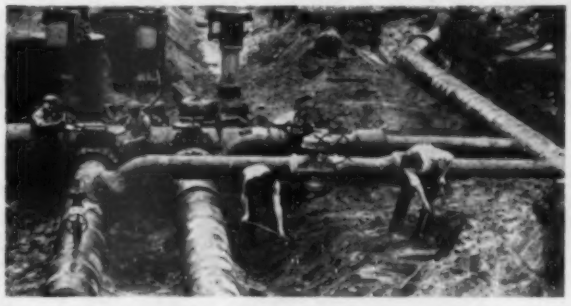
GET GASO DEPENDABILITY IN WATER FLOODING, TOO

DISTRIBUTORS

W. L. SOMNER COMPANY, Shreveport, Louisiana • Odessa, Texas • Tinsley, Mississippi • Brookhaven, Mississippi
POWER PUMPS, INC., Long Beach, California
PEDDLERS, INC., Houston, Texas
PUMP ENGINEERING CO., Wichita Falls, Texas
LUFKIN FOUNDRY & MACHINE CO., Casper, Wyoming
LUFKIN MACHINE CO., Ltd., Edmonton, Alberta



KING SIZE PROTECTION: 36" pipe, mill coated first with NO-OX-ID 6X for bonded insulation against moisture, then shielded with No. 7 NO-OX-IDized Wrapper and Service Coat for added electrical resistance and protection against soil stress. Finally, a kraft wrap to protect from damage in handling operations. This is long-term pipeline protection at its best.



WHERE ELBOW ROOM IS SCARCE: In crowded work space, No. 4 NO-OX-IDized Reinforced Fabric Wrapper is hand applied around irregular fittings such as valve manifolds on gas lines. No. 4 Wrapper, a coated fabric laminated to a plastic membrane, provides moisture-proof seal over pipe coating.

PROTECTION BY THE MILE: A NO-OX-ID coating combination is uniformly applied over-the-ditch by this traveling type machine. The NO-OX-ID 6X Base Coating is covered with an unbroken shield of No. 7 NO-OX-IDized Wrapper. The fabric side of the wrapper is an excellent surface for bonding a service coat.

NO-OX-ID PROTECTS...EVERYWHERE

Wherever pipelines go—into long or short line service, through rough terrain or rolling plains—there is a NO-OX-ID coating combination plus a method of application for long-term protection against corrosion.

WRITE FOR BULLETIN "Protecting Underground Pipe from Corrosion with NO-OX-ID and NO-OX-IDized Wrappers" tells the story. Your copy is ready upon request.

Dearborn Chemical Company, Dept. PE
Merchandise Mart Plaza, Chicago 54, Ill.

Gentlemen:
Please send my copy of "Protecting Underground Pipe from Corrosion with NO-OX-ID and NO-OX-IDized Wrappers."

Name..... *Title*.....

Company.....

City..... *Zone*.... *State*.....

Dearborn NO-OX-ID®

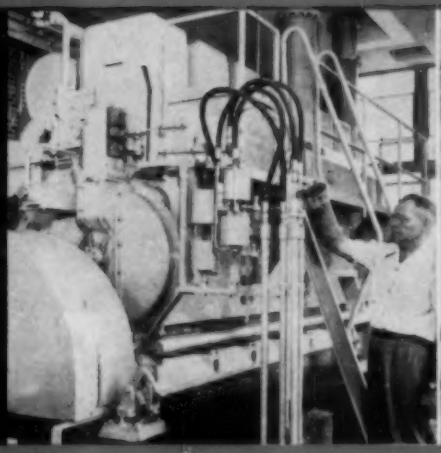
Protecting Metal Against Corrosion Since 1887

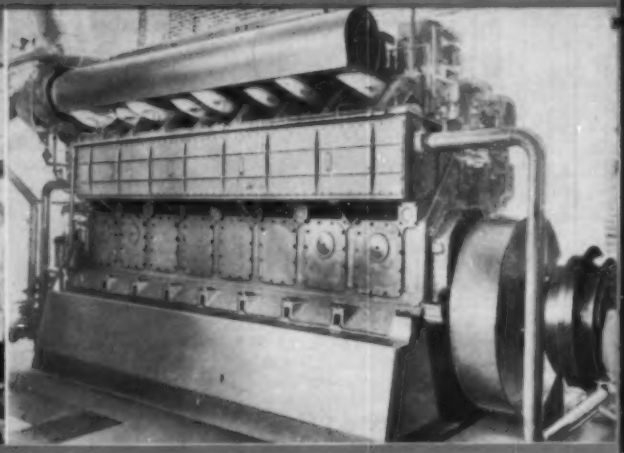
NORDBERG ENGINES

Provide Low Pipe Line Transportation Costs ACROSS the Continent

• Each year there are more and more Nordberg engines installed by pipe lines. The reasons are sound . . . these compact, more powerful engines efficiently meet the operator's requirements for all types of pumping.

NORDBERG POWER ON THE JOB:



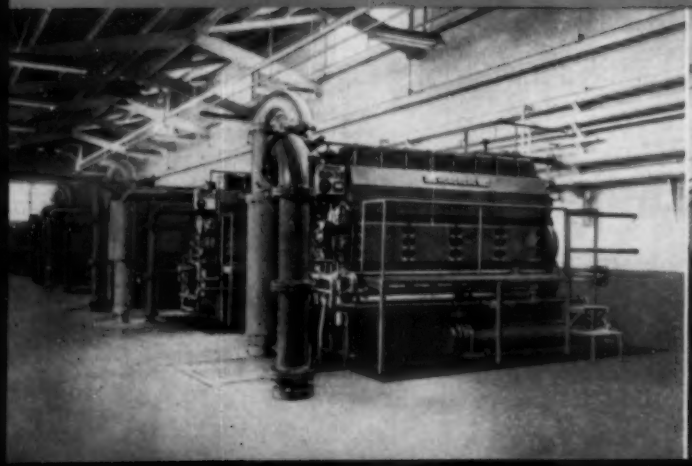


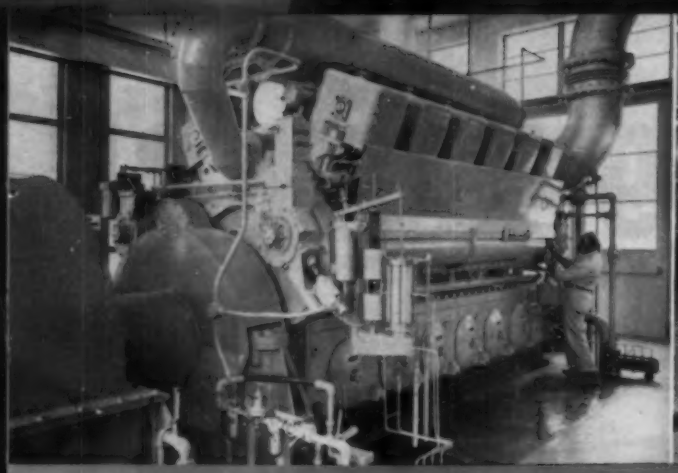
• One of two Nordberg eight cylinder, 1210 hp Supercharged Diesels on Shell Oil Company's Wood River products pipe line.

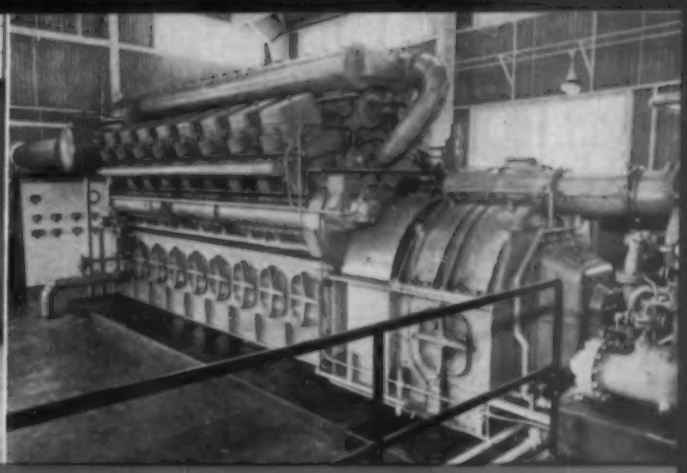
• Four of the 23 Nordberg engines installed in stations along the Rangeley, Colo.-Salt Lake City crude and products lines operated by Salt Lake Pipe Line Company.

• One of nine Nordberg eight cylinder, 13" bore SUPAIRTHERMAL® Dualfuel engines operating on a Phillips Pipe Line Company products line.

• Twelve of these Nordberg SUPAIRTHERMAL engines provide a total of 22,680 hp for pumping stations along the Lakehead Pipe Line Company's line.





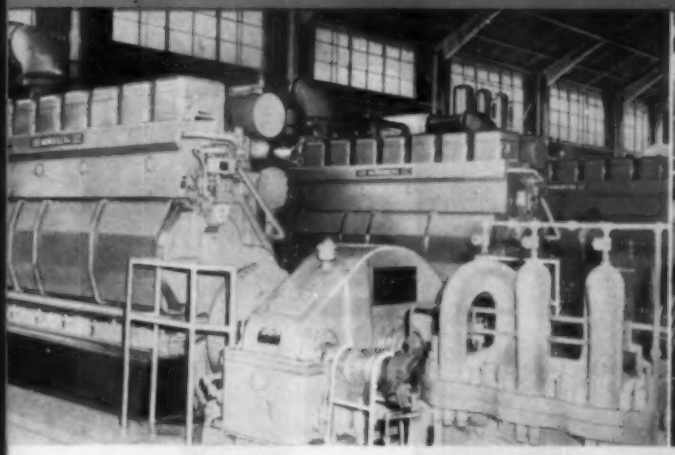


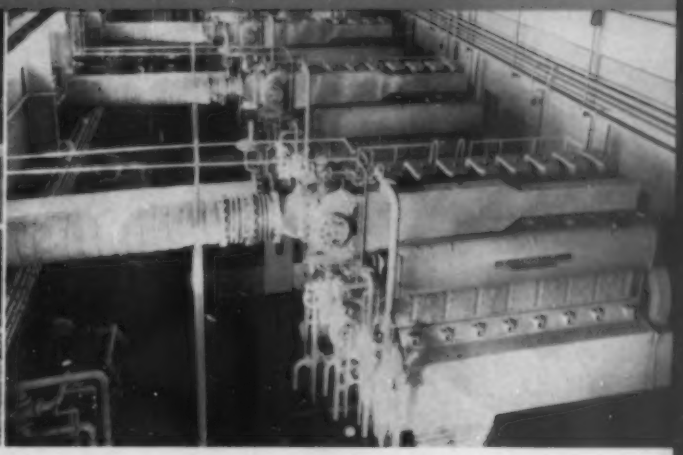
• Nordberg 2650 hp automatically-controlled SUPAIRTHERMAL V-type Diesel furnishes all power for the Vicksburg, Mich., station on the Wolverine Pipe Line Company's products line.

• Three of six Nordberg 1050 hp Duafuel engines installed in the Tejon and Wheeler Ridge stations of Richfield Oil Corporation's crude oil pipe line.

• 3000 hp Nordberg V-type SUPAIRTHERMAL Spark-Ignition Engine Gear Set driving a centrifugal gas compressor in Transcontinental Gas Pipe Line Corporation's Station 23 near Houston, Texas.

• Three of 12 Nordberg SUPAIRTHERMAL engines, totalling, over 20,000 hp, installed along the Trans Mountain Pipe Line from Edmonton, Alta., to Vancouver, B.C.





SUPAIRTHERMAL® ENGINES

the logical choice for these basic power jobs:

- PIPE LINE PUMPING
- GAS COMPRESSOR DRIVE
- POWER GENERATION

Nordberg four-cycle Supairthermal engines are available in a full range of sizes from 535 to 5000 hp for Diesel, Duafuel® or Spark-Ignition Gas operation, including both In-line and "V" types. The Supairthermal principle increases the engine's load-carrying ability over a wide speed range. This reserve power is like "money in the bank" when additional capacity is needed. We welcome your inquiry and the opportunity to assist you with your power study.

NORDBERG MFG. CO., Milwaukee, Wis.

Builders of America's Largest Line of Heavy Duty Engines—10 to over 12,000 Horsepower

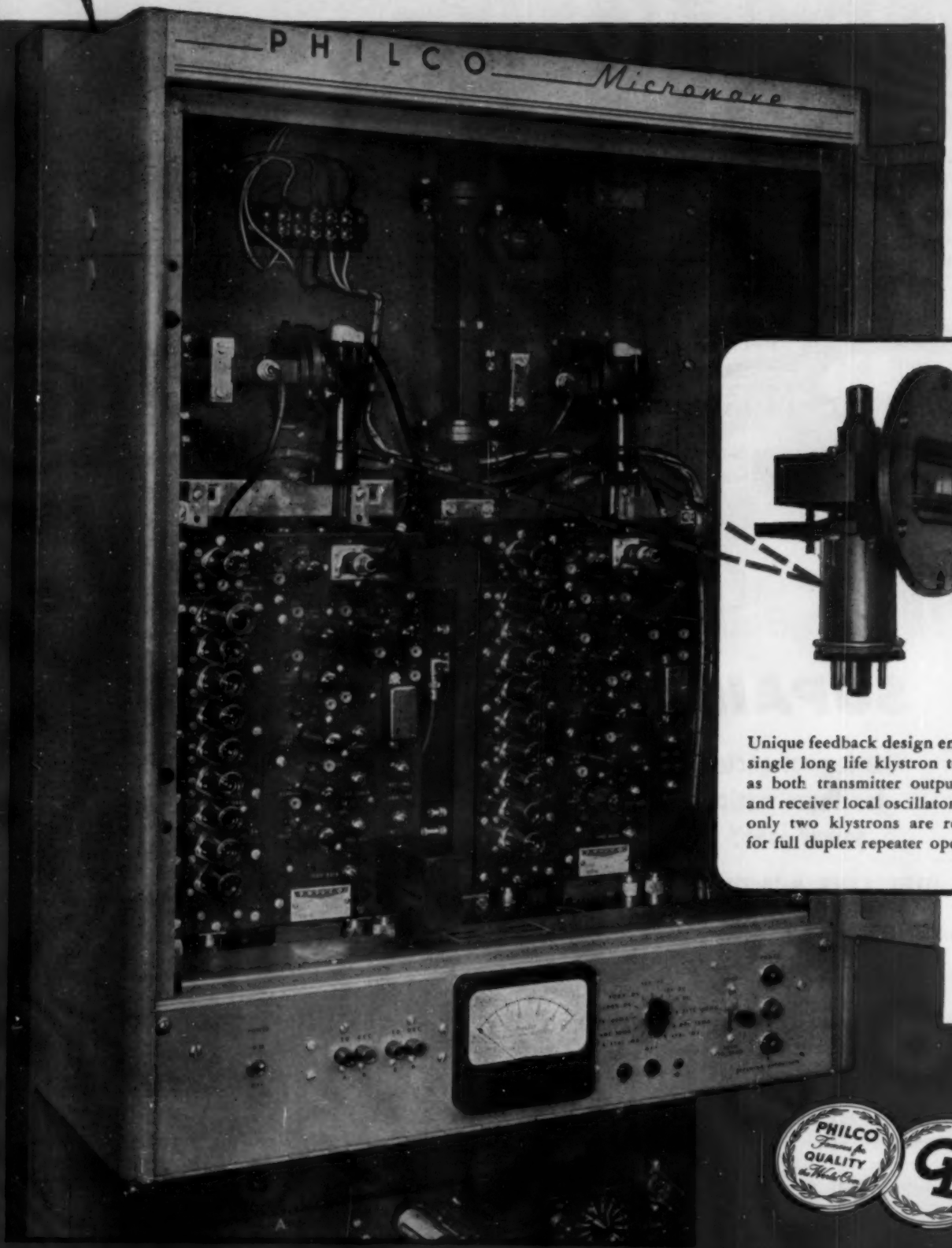
NORDBERG

DIESEL • DUAFUEL® AND SPARK-IGNITION GAS ENGINES

© 1956, Nordberg Mfg. Co.

0256

PHILCO gives you



Unique feedback design enables a single long life klystron to serve as both transmitter output stage and receiver local oscillator. Thus, only two klystrons are required for full duplex repeater operation.

PHILCO
Famous for
QUALITY
the World Over

GT

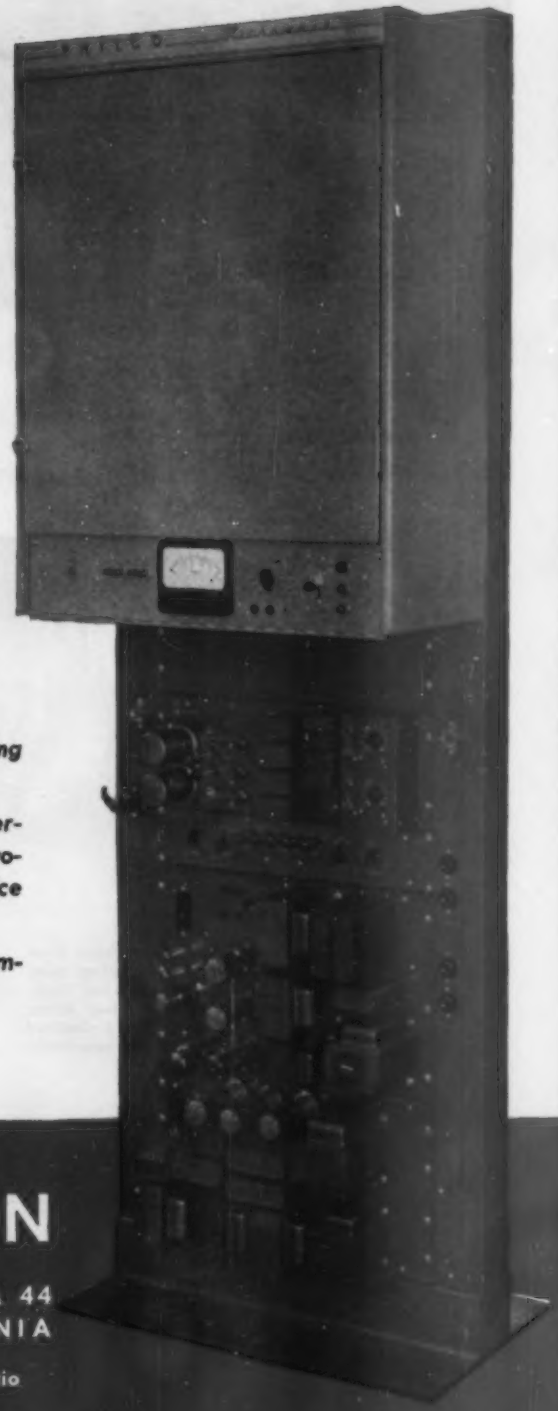
Ten Times More Microwave Power!

PHILCO'S "POWER HOUSE" klystron generates a full watt of power (10,000 watts Estimated Radiated Power) in the preferred 6000-8000 mc band . . . provides up to 10db additional safety margin.

Designed specifically for reliable, long distance communications, Philco CLR-7 microwave systems provide high quality communications facilities that accommodate voice, telemetering, supervisory control, teletype, and other forms of data transmission so vital to operations.

Available as a terminal or repeater in Common Carrier, Industrial, and Government bands, Philco CLR-7 microwave provides a degree of reliability never before attained in microwave equipments.

Get complete information on Philco microwave systems. Philco maintains a staff of design, systems, and field engineers experienced and fully qualified to help plan and design your microwave communications system. Write Philco, Dept. PE today.

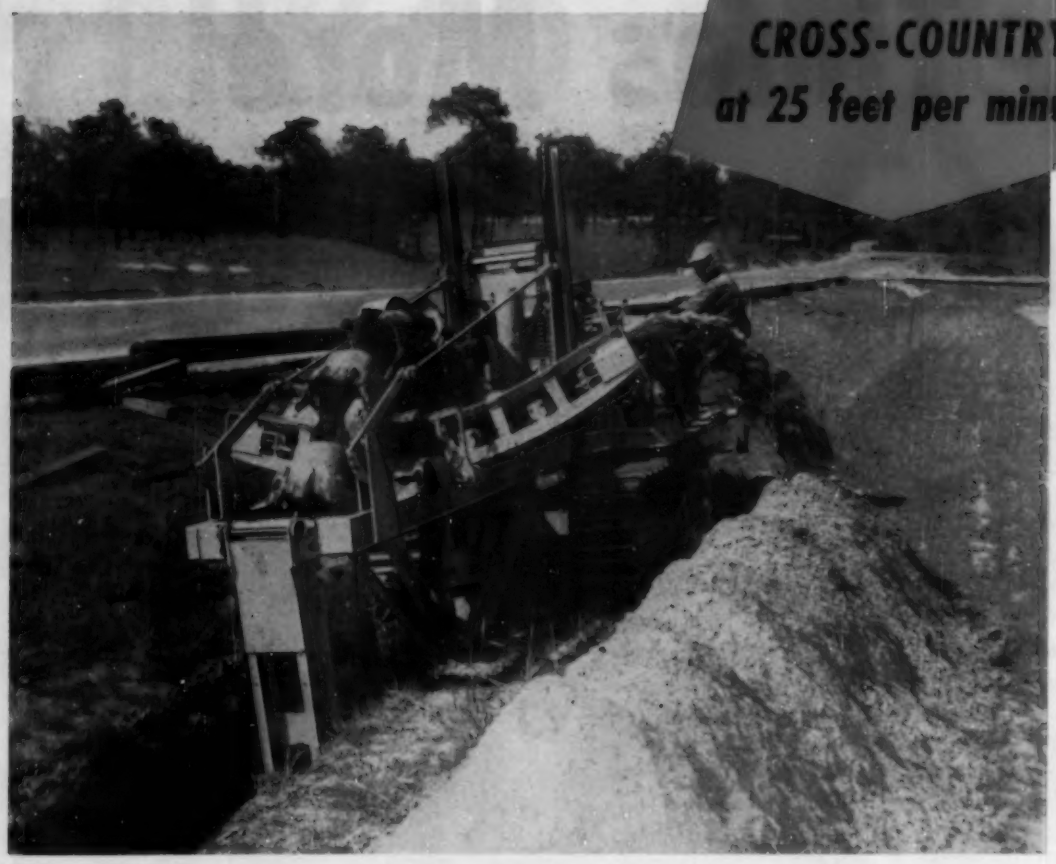


- ★ ***Designed for continuous unattended operation***
- ★ ***Base band available for telemetering and supervisory control . . . teletype***
- ★ ***Centralized system control from terminal stations***
- ★ ***Built in test and metering facilities***
- ★ ***Portable transistorized termination unit provides two-way signalling on service channel***
- ★ ***Conservatively rated components throughout***

PHILCO CORPORATION

GOVERNMENT AND INDUSTRIAL DIVISION • PHILADELPHIA 44 PENNSYLVANIA

In Canada: Philco Corporation of Canada Limited, Don Mills, Ontario



Mobile, utility-size Trenchmobile on rubber tires travels 12.6 m.p.h. — does trouble-shooting, pipe reclamation. It digs main lines, gathering lines, or laterals, 8 to 16 inches wide — 5 feet deep. (Parsons heavy-duty line also includes 3 sizes of ladder-type Trenchliners, full crawler mounted.)

. . . . . PARSONS CO., Newton, Iowa . . . . . .

Send us bulletins on: ☐ 88 Trenchmobile® ☐ 150 Trenchliner®

NAME_____

TITLE_____

COMPANY_____

STREET_____

CITY, STATE_____ P-880 PE

On main-line trenching, or as an auxiliary unit for opening laterals, Parsons 150 wheel-type Trenchliner sets a fast pipeline pace. 30 digging speeds, from 12 inches to 25 feet per minute, give top trench production at every depth, width, and in all soil conditions. Widths range from 16 to 26 inches — depths to 5¾ feet.

Speed and wide work range are combined with precision grading accuracy. A hydraulic ram on vertical mast raises and lowers the digging wheel — gives infinite depth selections, maintains close grade tolerance. A separate ram tilts the mast, balances wheel forward when traveling or trailer-loading. Notice, too, how simple mast design eliminates unnecessary superstructure — gives low overhead clearance, improves accessibility, operator visibility.

Dual-purpose friction clutch drives the digging wheel, and automatically protects against shock loads. Cast-steel buckets with "Tap-In" teeth are interchangeable with gumbo buckets. Shiftable, reversible conveyor discharges to either side. Standard, 16-inch, grouser-type crawlers provide plenty of sure-footed traction for cross-country work. Ask Parsons distributor about it, or send for catalog.

PARSONS COMPANY

NEWTON, IOWA • (Koehring Subsidiary)

1-YARD HOE digs 22½ feet deep

You've come to expect *extra work capacity* in Koehring machines — and you get just that in the new 405, heavy-duty leader in the 1-yard class. On hoe applications, it digs 43 inches wide over side-cutters — 22½ feet deep. Long reach puts spoil bank well beyond edge of cut — and gives 12½-foot clearance height (at beginning of dump) for truck loading. Cutting angle is adjustable to suit digging conditions. Equalizer at dipper assures even pull on each cable.

For all its powerful, fast action, this heavy-duty 405 is an operator's dream! Big power clutch requires only 1/10th the lever pull of a comparative-size manual clutch — yet retains accurate "feel" of load. Automatic traction brakes also simplify operation — are engaged at all times, except when tractive power is applied. They lock and hold the 405 when working or parked. Maintenance is simplified, too. There are only 2 main shafts in the 405's upper machinery. Each assembly is a completely independent unit with fully-enclosed gears, and splined shafts rotating on antifriction bearings.

Those are some of the reasons why you get more work done with every 405 attachment. It readily converts to 1-yard shovel, handles 1 to 1½-yard clamshell or dragline buckets on a wide work radius — has 20-ton lift capacity as a crawler-mounted crane. Your Koehring distributor has more information on this *extra-capacity* 405 that will interest you. Better call him soon — or write us for literature.

mail to:

KOEHRING Co., 3026 W. Concordia, Milwaukee 16, Wis.

Send us ☐ spec. sheets ☐ bulletin on Koehring 405

NAME_____

TITLE_____

COMPANY_____

DIVISION_____

STREET_____

CITY, STATE_____

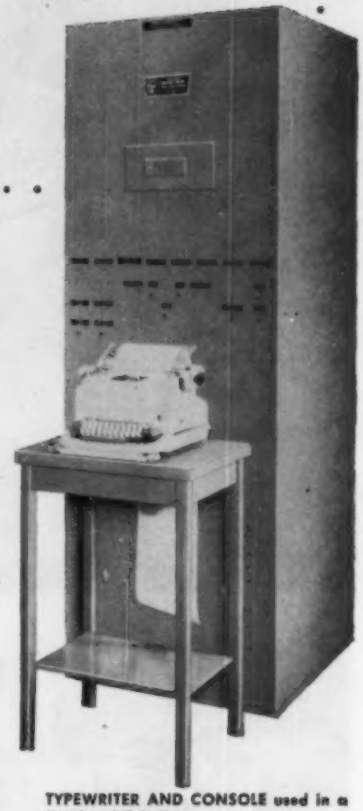
K683 PE

Subsidiaries: KWIK-MIX • PARSONS • JOHNSON

Outstanding Accomplishments of

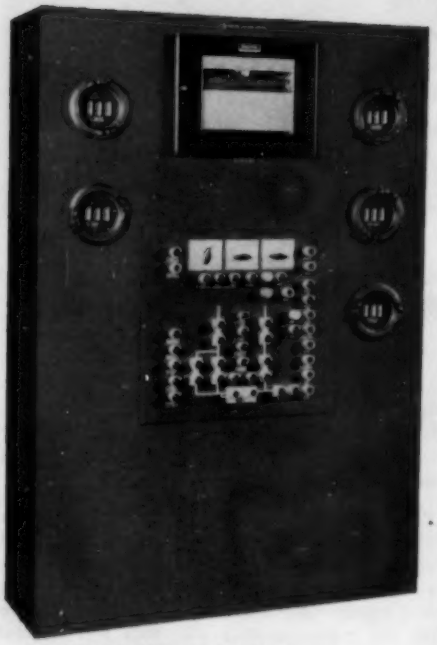
UNION CENTRALIZED TRANSPORT CONTROL

UNION Centralized Transport Control has been in successful operation on a number of pipelines and has proved highly dependable. It can give you reliable remote control and indications, and monitor the data for your entire pipeline from one central dispatching office. Among the many installations, two stand out for their unusual applications of UNION Centralized Control.



TYPEWRITER AND CONSOLE used in a UNION C.T.C. System.

Outstanding Accomplishments



UNION CONTROL PANEL for a gas-compressor station.

1. Complete remote control of pipeline pumping station with digital telemetering of variables. The information to be telemetered is incorporated into the Union Switch and Signal C.T.C. Code System in digital form. Transmission is protected the same as all controls and indications with assurance against errors in transmission. Information is automatically logged on a typewriter at periodic intervals, initiated on demand or initiated by upset conditions on the line. Entire systems can operate within 0 to 15 cycles minimum pulse rate to meet low-cost lease lines requisites.

2. Remote control of start-up, monitoring the operations and shutdown of a 3700 HP internal combustion engine driving a compressor on a natural gas pipeline. Engine speed is varied to control discharge pressure. Discharge controller set point controlled to a fineness of one part in 999 from remote location. Data telemetered digitally to main office by teletype.

UNION Centralized Transport Control can be used anywhere on pipeline layouts, gas distribution systems, gathering systems, tank farms and offshore installations. It has been thoroughly proved in service and is backed up by experience in centralized control covering more than 25,000 miles of long haul transportation. Write for booklet 1052 for information on your single or multiple station control requirements.

75 Years 1881 1956

OF EQUIPMENT AND SYSTEMS ENGINEERING . . . . .

UNION SWITCH & SIGNAL

DIVISION OF WESTINGHOUSE AIR BRAKE COMPANY

PITTSBURGH 18, PENNSYLVANIA

100% A. O. Smith Meters!

THE Badger Pipe Line Company at Madison, Wisconsin, is serving seven major oil company terminals. The pipe line and all of the terminals have installed dozens of A. O. Smith Meters. Included are models S-35, AS-50, S-75 and W-75 with *functional* accessories such as dual heads and remote registration. 100% selection of A. O. Smith Meters is another recognition of their accuracy, dependability and low-cost operation. For further information contact nearest office or representative.

Through research ...*a better way*

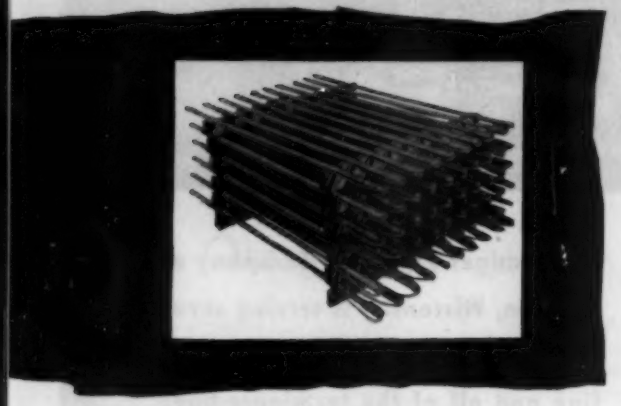
A.O.Smith

CORPORATION

METER PRODUCTS

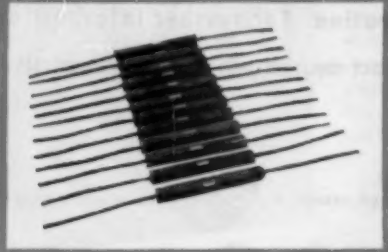
Factories: 5715 Smithway St., Los Angeles 22, Calif., P.O. Box 500, Succasunna, N. J. Offices: Atlanta, Chicago 7, Houston 20, Los Angeles 22, New York 17. Canada: Toronto 12, Vancouver 1, International Division—Milwaukee 1, Wis.

When Duriron was first introduced as a cathodic protection medium, performance data reported was necessarily that of simulated field conditions in the laboratory. Now, with installations numbering more than 15,000 anodes, we can report qualitatively on Duriron in various ground bed, fresh water or salt water conditions.



Qualitative reports now available on DURIRON® in cathodic protection service

Many of these reports are available now. More are currently in preparation for early release. If you feel that your present method of protection could be improved, we urge you to let us send you these reports as they become available. They more than confirm our reports of laboratory results!



THE DURIRON COMPANY, INC.
Dayton, Ohio

DURIRON® anodes

The Duriron Company, Inc., Dayton, Ohio, Dept P.

PLEASE SEND REPORTS ON DURIRON ANODE INSTALLATIONS.

Name_____ Title_____ Company_____

Address_____ City_____ State_____

Progress in Pipelining

Equipment, Manpower Use Made More Effective

- **In all phases of pipelining the key word is automation**
- **Construction goes to larger diameter pipe, heavier equipment**

Frank H. Love, *Editor*
The Pipeline Engineer

THE watchword in pipe line construction and operations today is *"costs."* Companies operating crude oil and products pipe line systems have not had a rate increase in several years. Consequently, to survive and show a profit, they have had to eliminate all excessive costs.

To this end there has been a general reduction in construction cost of stations, a reduction in the number of operating personnel, and minimized operating costs through more efficient use of equipment and manpower.

The situation in regard to long haul gas transmission systems is much the same. More and more it is recognized that greater consideration must be given to both current and future construction costs.

Contributing factors can be found in the price of gas, cost of labor, and mounting construction charges. These added levies on the industry have reached a point where methods and results must be carefully weighed, to the end of providing uninterrupted service to gas customers while holding price to a level that will make the commodity desirable and competitive with other fuels.

The answer to this problem is being found largely in new and better equipment to increase capacities, but at the same time obtaining this objective at less cost to the operator.

To arrive at as nearly complete coverage as possible of important progress in pipe line construction and operations, and point the direction in which the industry is headed, THE PIPELINE ENGINEER asked a number of leading operators and constructors to give us the benefit of their knowledge. The response has been generous and acknowledgment to these individuals and their companies will be found at the end of this article.

Reaching the Goal by Automation

The goal of greater throughput and curtailed expense is being attained largely by means of automation. Automation takes on many forms — remote station operation, automatic sampling, monitoring and protective devices, automatic lease custody transfer, automatic gaging and metering, and many more functions.

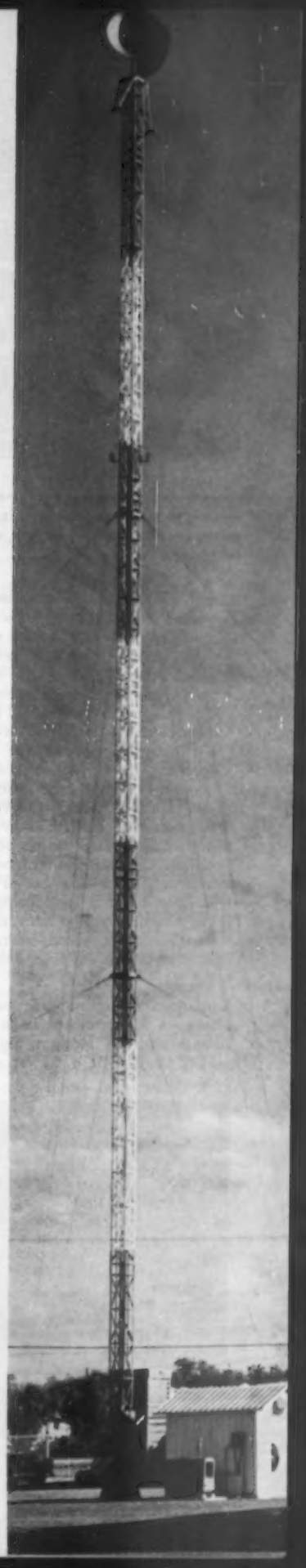
The general superintendent of a key pipe line system lists the following as his nominations for the most important items of progress in pipe line operations:

1. Completely unattended, remote controlled stations with full telemetering to the control station, as well as to the control dispatching office.

2. Metering of both crude and products lines with particular reference to improved methods of meter calibration.

3. Automatic sampling and signalling of cut-points of interfaces.

4. Reduction in construction cost



Improvements in equipment in recent years have made possible the outdoor placement of pumping equipment, as evidenced by the large products pipe line station shown here. Weatherized by using modern materials and designed for hazardous location operation without danger, the station functions year 'round in all types of weather.

of stations and terminals, reduction in personnel required to operate a system, and attendant cut in operating cost.

In elaborating on these points, he says further: "The general trend is toward complete automation. Although control systems will become more complex, the operation of them will be simpler. A logical step in products pipe lines is the development of small intermediate terminals into which deliveries will be made by remote control from the central dispatching office during period of no attendance at the terminal. Such a terminal can be operated by one man on duty for truck loading only. On proprietary pipe lines, no terminal personnel would be required, as truck drivers would load their own vehicles with meters recording both at the location and central office.

"Throughout the country we can see elaborate main stations and almost equally elaborate booster stations. The next few years should see the construction of many unhoused pumping stations at considerable savings in construction and operating costs."

These views are shared substantially by others. A chief engineer, for example, points out that the large stations with attached camps are giving way to automatically or remotely controlled stations. As a part of this, he says, is the fact that liquid lines are slowly evolving into simplified closed systems, with manifolding, tankage, and auxiliary equipment minimized.

Supported by a backhoe boom, workman measures depth of river bank approach. Channel has been dug in middle of river, as is indicated by piles of rock and dirt. Modern, high-speed, high work factor construction equipment makes tough jobs a matter of a few hours' or days' work instead of weeks or months.

Along the same line the vice president of a crude oil line observes that the trend toward automatic and remote controlled pumping stations has influenced the installation of units of larger horsepower in order to keep the number of individual units to a minimum. "We will see a continuing trend to larger prime movers, both electric and diesel, and development of the use of the gas turbine," he says.

Tapline's scheme of providing portable package units also is extremely interesting and bears watching for future developments.

A most important recent development, and one that has almost unlimited possibilities, is the use of electronic calculating equipment. An enthusiastic appraisal of these possibilities comes from the vice president and manager of a products pipe line system.

"We have specific knowledge that some of the manufacturers are prepared to place on the market a much smaller and cheaper version of the Univac," he says. "It seems to me that this development, tied in as it is with improvements that already have been made, can contribute immeasurably to pipe line scheduling, automatic operation and accounting; and I would like to review what those developments are.

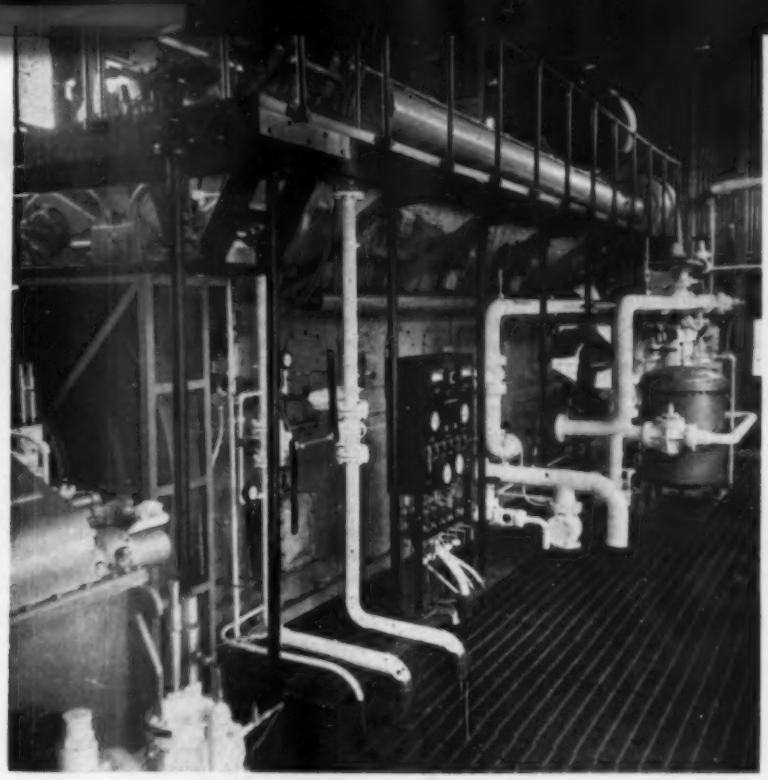
"With the solution of the internal corrosion problem of product pipe lines through the use of oil-soluble inhibitors, the maintenance of positive displacement meters becomes relatively simple. Positive displacement meters in use under such conditions produce results which are accurate almost beyond belief. Accuracy increases revenue, since all pipe line tariffs contain provision for a deductible allowance; and the smaller the actual loss, the greater the revenue.

"Pipe lines which own or use microwave facilities seem to be in a preferred position. With a multitude of channels, it is possible to bring to a central point intelligence of all sorts, and integrated data transmission is one of the simplest of operations. Now, if electronic calculators of reasonable dimensions and price can be fed this intelligence, improved operations and reduced accounting costs should result."

The views expressed here on the future place of electric data processing equipment for design, scheduling, etc., were made the object of special mention by many others who shared the same overall views.

Metering of Crude

A contributing factor in crude oil pipe line automation is metering. Some companies have developed crude oil metering quite extensively, but it still



The world's first fully automatic engine-driven centrifugal compressor station is at Stanton, Kentucky, on Gulf Interstate Gas Company's system. It is operated remotely from Clementsville station, 80 miles upstream. The engine, shown here, is a 4-cycle, 3700-hp reciprocating unit.

offers a challenge. The problems involved are greater than in the case of metering products.

Products pipe lines have adopted, or are in the process of adopting, 100 per cent metering. It is freely predicted that metering of crude oil will be in general practice within the next three to five years. With it will come more widespread adoption of automatic lease custody transfer, which also involves automatic samplers and automatic quality control of crude oil.

Compressor Station Operations

Chief objective of most gas pipe line companies today is to effect greater efficiency in the operation of compressor stations. This is a direct result of the increase in the field price of gas and the continuing increase in labor costs. In view of these two factors, the industry is working more than ever with manufacturers to develop more economical equipment and greater automation. Some of the steps taken, and the results achieved are:

1. Turbocharging old horizontal-type natural gas operated compressors. Turbocharging reduces the amount of fuel used per brake horsepower hour developed, and increases the horsepower hour rating of the engine by approximately 40 per cent.

2. Installation of gate valve operators and automatic pushbutton starting devices has been accepted as a means of reducing labor requirements.

3. The use of 4-cycle supercharged gas engines direct connected to pancake type reciprocating compressors, or connected through a step-up gear arrangement to centrifugal compressors. Advantages are exceedingly low fuel requirements per horsepower hour developed (6400 Btu per bhp-hr) and higher engine ratings (3500 to 4000 hp), reducing the number of units required in any one station and resulting in fewer employees.

4. Unitization of compressor stations using hydraulic or mechanical drives direct connected to the main compressor unit for the operation of the auxiliaries in connection with the closed water system, oil cooling, etc. This reduces investment in that it eliminates auxiliary buildings, and also reduces labor requirements.

5. Remote controlled compressor stations. A perfect example of this is the compressor station constructed by Gulf Interstate near Stanton, Kentucky, which is remotely controlled from a station some 80 miles upstream. This has greatly reduced labor costs.

6. Improved methods of lubricating oil control, which prolongs the life of, and reduces requirements of lubricating oil per brake horsepower hour developed.

7. The use of power-driven tools, such as electric floor polishers, air-operated cranes and hoists, air-operated wrenches, and numerous other power-driven small tools has greatly expedited repair work, thus reducing down time of equipment and labor requirements.

On the subject of automation as applied to compressor station operations, the general superintendent of the transmission department of one of the major companies, points out that "we are rapidly approaching the point where main line compressor stations of 14,000 hp and over will be run with no personnel on shift."

"The starting and stopping of the engines and the controlling of plant pressure conditions will all be done from a remote location or from a central dispatching headquarters. All of the data required to perform remote operation will be transmitted by telemetering facilities to the control center," he confidently predicts based on the significant advances already made.

Flow Efficiency

Maintenance of flow efficiency is another vital part of the overall economic aspect of operations. Two major developments have been made in recent years. One is the design of full opening main line valves in large sizes. These, together with development of procedures and equipment for routine on-stream pigging of the line, have provided the means for systematic cleaning of pipe lines in service to maintain flow efficiency by removal of liquids and other accumulations to keep the inner wall surface of the pipe in substantially new condition.

The second factor is the development of techniques and materials for internal coating of pipe lines. This method is being used to coat new pipe to prevent corrosion and maintain a high level of flow efficiency, as well as old pipe that has been in service to reduce loss in lines that already have been damaged.

One gas transmission company reports experimenting on two miles of an old 8-in. coupled line that was leaking at approximately 50 per cent of the couplings. Leakage was reduced approximately 94 per cent at a working pressure of 200 psi. Using information gained from this experiment, the service company that did the work is now developing improved techniques so that such coating can be applied with the pipe line on stream and also obtain a more effective cure than that obtained during the experiment.

If the process proves completely successful, its future possibilities are great, because it could eliminate the necessity of rebuilding many of the country's older pipe lines and thereby relieve a great economic burden entailed in such rebuilding.

Communications

It is generally recognized by the pipe line industry that microwave radio communications systems are the most important recent development in communications. Such a system provides a large number of channels that may be used for telephone circuits, teleprinters, telemetering, and supervisory control. Since teleprinters have almost entirely replaced telegraph as a means of communicating written material, this system is now being used for the transmission of integrated data for distant processing. Although in its embryonic stage, the trend is very definite that this utilization will be greatly expanded within the next few years.

Almost any kind of data can be coded in the field and transmitted by teleprinter to distant offices where the tape is then inserted into business machines that punch cards, tabulate the information, and even write checks if desirable. Many oil run tickets are being handled in this manner and payrolls and other information will follow.

As the trend in pipe line operations is to automation, the value of a good communications system, one that is highly dependable, is of greatly increased importance. It is not anticipated that microwave will replace all existing wire lines, on which a considerable number of circuits may be provided by superimposing on them carrier circuits. This is the most economical method for five or six channels or less.

In providing facilities at the outset, however, where no present communications facilities exist, "microwave should be considered, as it has gone through a period of development and is now considered dependable, and as economical to install and operate as wire line facilities where as many as five or more channels are required." These facts are pointed out by the communications superintendent of one of the large pipe line systems.

Construction and Maintenance

The most important progress in pipe line construction has been the marked increase in quality, says a prominent operating company official. To elaborate on this statement, he comments further:

"I believe we are getting the best over-the-ditch pipe line welding in history. Much of this improvement can be attributed to the attitude of the workman, as present day spreads have a completely different type of personnel than 10 years ago. Every contractor and employee today is interested in the quality of his work and strives to perform his job as a part of a team.

X-ray inspection has contributed to a better quality of welds. We are also getting the best over-the-ditch coating in history. This is due principally to new application equipment and improvement in quality of coating materials.

Other phases of the work have improved also. We find that the pipe fits the ditch better, backfill operations cause less damage, fences are replaced in better shape, and the entire pipe line is a highly uniform, excellent job. Better equipment and better men are the answer."

Improvements in equipment, methods, and people would seem to summarize progress based on this statement. What *are* some of the improvements in equipment?

The use of large-diameter thin-walled pipe of high tensile steel continues to be the trend. The economic importance of developing manufacturing processes for producing this large diameter high strength pipe is obvious. Even greater progress in this direction seems imminent. Advancement in the chemistry of steel promises to make possible production of pipe 30-in. or more in diameter that is capable of withstanding operating pressures of 1200 to 1500 psi. Important factors contributing importantly to the successful use of thin-walled pipe at high pressures have been the development of good coating materials and a better understanding of corrosion and its control.

Construction of pipe line systems with large diameter pipe, which provides greater throughput and economy of operation, has resulted in larger and more powerful equipment to do the job.

Obviously, the day is nearing when some form of automatic welding will be a reality. The resulting weld will be uniform and inspection requirements less stringent. Already automatic welding has been used wherever possible, but this has been principally for double jointing in a yard and not on the line.

Equipment for screening fine material from the spoil bank in rocky areas, for padding pipe in the ditch, is looked upon as an important tool. Although this equipment was only re-

Pipelining: Past

In the early 1900's and prior to that time all pipe lines laid were of screw-end pipe and all construction was by hand. Huge pipe line camps were maintained to properly shelter and feed the pipe line gangs employed in construction. Gangs of 90 to 100 men were used to lay 8-in. pipe lines and 135 to 140 men gangs were required for construction of 12-in. lines.

In earlier days it was important to make sure that there was sufficient slack in the line to keep the couplings from pulling apart. This type of repair was expensive and the lines had to be cut and flanged back together or an expensive stuffingbox used that had to be packed. Today, with welded lines, this is not nearly so important and less expensive.

The early day pump stations were primarily steam powered, requiring large batteries of boilers with steam pumps. Station maintenance and fuel were expensive.

Following the steam pump stations came the old slow running diesel engines with heavy plunger pumps. Transportation of the heavy equipment to the station site, installaton costs and maintenance on this type of equipment were very expensive and large crews were required for operating the stations.

In gathering operations of the old days, a large gang was required in each field as the gang could only work within walking distance from headquarters, and all tools, etc., were hauled on wagons. All pipe had to be strung with mule teams.

The producer would build a boiler station near each tank battery and the pipe line company would set a steam pump to pump the oil out. As the wells started pumping, the producer would build a power station. Several wells could be pumped from this central station by laying a separate rod line to each well. The pipe line company would then set a rod line pump, which was connected to this central station and pulled by a rod line. This was very slow and expensive.

Today, with the roads, trucks, welding machines ,high speed pumping units, etc., a headquarters can be established to handle the gathering of several fields, some as far as 100 miles away, greatly reducing cost of operations.

World War II marked a new era in pipe line construction and operation. With new types of heavy equipment designed for pipe line construction, larger diameter of

Present, and Future

pipe, and high speed diesel and gas engines, electric motors, centrifugal pumps, many automotive control devices, "pipelining" came into its own.

New and larger ditching machines, coating and wrapping machines, pipe bending machines, sideboom tractors and dozers, portable welding machines, marine pipe line construction equipment, and other types of heavy equipment brought about the transition of single large diameter lines replacing multiple small diameter lines. During this immediate postwar period many new techniques were introduced to pipe line construction and operation.

Design and construction of pipe line pump stations kept abreast of the rapid change of the pipe lines growth into the "Big Inch" stage. Hand-in-hand with the large diameter pipe, pump stations became more modern, fewer, and spaced greater distances apart. Selection and application of new type of pumping equipment including motor-operated valves, console control panels, automatic tank gagers, automatic agitators, electric motors, centrifugal pumps, high speed duel fuel engines, and other automatically operated devices, at the so called "push-button" stations today, have brought marked improvement in pipe line and pumping efficiency. Greater quantities of oil are being moved with less equipment and less operating manpower.

The hand-in-hand transition of small diameter multiple lines to single large diameter lines and new designs of automatic "push button" pump stations have been outstanding developments in pipe line progress. They provide the base for broader application of automation for future pipe line construction and operation.

The future outlook for pipe line transportation is promising. With still larger diameter pipe being planned and manufactured, unattended remote controlled pump stations, automatic welding, meter measuring of crude oil, automatic gauging in oil fields and many pipe line automation projects in the planning and experimental stages, all point to more progress in pipelining for the future.

—Staff, Interstate Oil Pipe Line Company.

cently unveiled, operators are viewing it as a means of solving a heretofore serious and costly problem.

Increased drilling activity in offshore waters has stepped up pipe line construction in those areas, and future operations are certain to be even greater. Such lines will be of larger diameter pipe and increasingly longer. As to be expected, cost of laying lines in Gulf waters has been high and doubtless will always be higher than for land lines. As techniques and equipment for the work improve the cost is expected to be reduced. Already marked improvements have been made.

The construction methods are in general use:

(1) Laying from a barge by the stove-pipe method, and

(2) the push or pull method.

The latter involves either pulling into place with the pipe resting on the bottom of the Gulf or other body of water, or floating into place with the pipe held off bottom by means of buoys. The pull or push method, of course, requires sufficient land space for the pipe joints to be welded into long strings.

Pipe coatings and wrappings are constant subjects of research and improvement. Despite the high degree of effectiveness of present materials, new types are being placed in use. A recent coating tested is an epoxy resin type that is painted on the pipe. Recent years also have seen chemically treated tape-type wrappings used on various size pipe.

Here are some brief tabulated views on construction and maintenance not discussed previously in this article; some of these methods and equipment are now in use, others may be tomorrow or the next day.

1. Use of concrete jacketing in lieu of river weights.
2. Less emphasis on slack-loop construction procedures.
3. Improved use of small equipment to replace manpower on small construction and maintenance work.
4. Improved inspection of river crossings through the use of various sounding and pipe locating devices.
5. Use of better communciations and faster transportation facilities for small construction or maintenance work.
6. Increased use of specialty contractors to perform special maintenance.
7. Improved coating materials and coating procedures.
8. Greater emphasis on the use of improved cathodic protection techniques.
9. Changes in construction and maintenance procedures to conform with more stringent state requirements.
10. Increased overall speed in planning and constructing pipe lines.

Progress has been outstanding in the pipe line industry, but all problems have not been solved. There is still much room for ingenuity and effort. Here is one operator's idea of some of the things that still need to be done:

(1) Better methods of meter calibration;

(2) A good electrical valve-positioning motor;

(3) Better valves, operated from hydraulic energy in the system;

(4) Automatic lubrication system for remotely controlled stations.

Acknowledgment

For the information contained in this article we are indebted to a good many people. Thanks are extended to the following for their assistance:

Oma R. Bates, Manager Public Relations, and Management Group Members, Interstate Oil Pipe Line Company, Shreveport, Louisiana.

H. F. Bell, Acting Chief Engineer, American Oil Pipe Line Company, Houston, Texas.

W. T. Bulla, Superintendent of Operations, Natural Gas Pipeline Company of America, Chicago, Illinois.

J. S. Burden, O. R. Burden Construction Corporation, Tulsa, Oklahoma.

Hezzie Clark, Superintendent Communications and Electrical Department, Humble Pipe Line Company, Houston, Texas.

L. R. Dickinson, President, Trans-Northern Pipe Line Company, Toronto, Canada.

R. P. Dougherty, General Superintendent, Minnesota Pipe Line Company, St. Paul, Minnesota.

O. L. Entrekin, Pure Oil Transportation Company, Chicago, Illinois.

K. T. Feldman, Part Interest Executive, Sinclair Pipe Line Company, Independence, Kansas.

W. G. Hortsman, Vice President-Operations, Plantation Pipe Line Company, Atlanta, Georgia.

J. E. Johnston, Superintendent Transmission, Production, Engineering, Oklahoma Natural Gas Company, Tulsa, Oklahoma.

John L. Kelly, Vice President in Charge of Operations, Continental Pipe Line Company, Ponca City, Oklahoma.

Ben D. Leuty, Vice President and Manager, Pipe Line Transportation, Cities Service Pipe Line Company, Bartlesville, Oklahoma.

R. H. Lynch, Vice President and Manager, Products Pipe Line Division, Atlantic Pipe Line Company, Philadelphia, Pennsylvania.

F. J. McElhatton, Superintendent of Transmission, Panhandle Eastern Pipe Line Company, Kansas City, Missouri.

Ralph Moore, President, Platte Pipe Line Company, Kansas City, Missouri.

A. H. Newberg, Chief Engineer, Service Pipe Line Company, Tulsa, Oklahoma.

Sy Orlofsky, General Superintendent Transmission Department, Gulf Interstate Gas Company, Houston, Texas.

R. K. Paine, Manager, Pipe Line Department, Standard Oil Company of California, San Francisco, California.

Harold C. Price, President, H. C. Price Co., Bartlesville, Oklahoma.

H. A. Proctor, Manager Engineering, Southern California Gas Company, Los Angeles, California.

J. R. Shipley, Vice President, Sohio Pipe Line Company, St. Louis, Missouri.

G. H. Supple, Vice President and Director, Pipe Line Department, General Petroleum Corporation, Los Angeles, California.

★ ★ ★

(191) Pipeline Casing Insulator – High Dynamic and Static Load Capacities

Style 4 Thinsulator, designed for pipe lines in casing under highways and railroads, incorporates many new features that are claimed to make this

insulator desirable for all sizes of pipe lines under any conditions.

Solid steel runners that are machine welded to the wide steel band withstand high shear stresses and static loadings up to 28,000 lb.

The improved "sling-type" joint features round steel sleeves that rotate, permitting easy alignment of studs when installing Thinsulators, thus protecting pipe coating from damage. The synthetic rubber insulating liner is securely bonded to the steel band, which grips tightly whether the coated surface is exactly round or not. Dielectric strength of the rubber liner is rated at 40,000 v.

Thinsulators are thin insulators: compact enough to afford ample clearance between drag section and casing.

Thinsulator Specification Table

Pipe Size	No. of Runners#	Rated Static Load Capacity Lb*
36	8	
34	8	28,000 lb
32	8	
30	7	
28	7	25,000 lb
26	7	
24	6	
22	6	16,500 lb
20	6	
18	5	
16	5	13,000 lb
14	5	
12	5	
10	5	9,000 lb
8	5	
6	4	5,000 lb

Including sling-type beveled joint.
* Pure static loading based on 2 to 1 safety factor of design load.

Compactness incorporated in this design provides the extra space needed between the pipe and casing to assure installation without damage.

The number of steel runners varies with the particular size of Thinsulator, for example: For pipe sizes 8 in. through 18 in., five runners are used. For pipe sizes 20 in. through 24 in., six runners are used, etc. All runners are equally spaced to insure support at all points should the drag section be forced to the sides or top of casing. Intensive stress analysis has established the correct number of runners and spacing to create a design of maximum strength with minimum cost.

T. D. Williamson, Inc.

(193) Self-Propelled X-Ray Apparatus Improved

Recent design changes now permit Industrial X-Ray Engineers to use their X-Ray Conduit Tractor inside pipe ranging in size from 14 in. to 36 in. diam. Inside exposure technique provides maximum safety to pipe line constructors' personnel and allows a complete circumferential weld to be made in one exposure, on a continuous film. This is important in controlling weld quality. The inside exposure technique is ideal for heavy wall pipe on river crossings.

Important results of the new design are increased operating speed and greater portability. These enable Industrial's examining units to inspect a

much higher percentage of field welds than was formerly possible.

The photograph shows the new Conduit Tractor attached to Industrial's 360F x-ray unit for travel inside the pipe line. An ingenious weld locating device permits it to be stopped in position at selected welds for x-ray inspection.

Industrial X-Ray Engineers

(194) Machine for More Economical Ditch Padding

Crose Manufacturing is now producing a pipe line ditch padder. As the first pipe padding machine, this equipment introduces new, important economy to the pipe line construction industry.

Pipe line ditch padding in rocky country—so long an expensive cost item in pipe line construction—now becomes an economical, fast operation.

The "brain" of this machine is the screening or cutting head that sorts all available padding material from the spoil bank and by conveyor deposits it completely around pipe in open ditch. Sharp, pipe-damaging rocks are screened out and left alongside ditch.

Only selected, soft and rock free soil is utilized for padding.

This is a self-powered unit—a 50 hp industrial engine with torque converter operates screening head and conveyor. Unit is quickly attached or detached from a standard pipe line side-boom tractor in a matter of minutes. Unit may also be mounted on a back-hoe or drag-line boom.

Use of the machine eliminates hauling of padding material from distant locations. It is a time and money saver, whether figured from the standpoint of days in use or miles of pipe padded.

Typical example of estimated savings by using the machine to pad 26 and 30-in. pipe in a rocky ditch: $3,800 per day; a saving of $380,000 to the contractor padding 100 miles of rocky ditch, or $1,900,000 for 500 miles.

Unit prevents damage to pipe or coatings from sharp rocks. Elimination of nicks and scars minimizes possibility of pipe splitting under high pressure and improves corrosion protection. Different size auger conveyor tubes are available.

M. J. Crose Manufacturing Company, Inc.

(200) Multiple-Outlet Headers Simplify Pipe Line Gate Settings

Multiple-Outlet Headers developed by Ladish are reported to have effected savings up to 70 per cent in welding time required to complete by-pass,

blow-down and branch connections in pipe line gate settings.

These Ladish headers have seamless outlets in exact specified locations, thus reducing field work to a matter of making simple butt welds to valves and auxiliary lines. The costly, undesirable practice of nozzling in branch connections and saddle reinforcements is eliminated.

Ladish Company.

(202) Wagon Drill-Compressor Team

Drilling shot holes for pipe line trench blasting operations in rocky terrain is a fast and smooth operation with this team of equipment developed by Chicago Pneumatic. Drill rig consists of a pair of positive-feed, tubular, wagon drill carriages, equipped with hard-hitting 3½-in. drifters, and suspended from the boom of a crawler tractor, which pulls a highly mobile air supply—a track-mounted, 600-cfm "Power Vane" Rotary Compressor. Special crawler track mounting increases maneuverability, and improves stability and flotation on bad ground.

Chicago Pneumatic Tool Company.

(199) Trencher Features Finger-Tip Control

Claimed as an outstanding contribution to the trench-excavating phase of the petroleum field is the new Parsons Model 150 Trenchliner. The Model 150 excavates trenches from 16 through 26 in. wide to a maximum depth of 5¾ ft.

Prominent among the 150's many features is the hydraulically actuated wheel hoist. One hydraulic ram and cylinder lowers and raises the digging member with finger-tip control and permits maintenance of finest grade tolerances. The second ram and cylinder controls the digging wheel mast, positioning it vertically for digging and tilting it forward, placing the load over the center of the crawlers, for roading and loading.

A long, wide crawler system provides a minimum ground bearing pressure that permits working in the softest ground conditions with positive traction. The tractor-type design, which incorporates replaceable pins and bushings in the links, assures maximum service life.

Maximum production is said to be assured in all soil conditions through the wide range of speeds for all operations. Enclosed gearing running in a constant oil bath and anti-friction bearing mountings assure maximum delivery of the engine's power to the operational functions by minimizing friction loss and also adds to the productive time of the Trenchliner by reducing down-time for repairs.

The engine, either gasoline or diesel, is equipped with a friction-type clutch. Drive to either crawler is independent through brake band-equipped friction clutches, which provides for the highest degree of maneuverability for the 150. Overloads encountered by the digging member are dissipated, preventing damage to the machine, by a slipping of a friction clutch in the wheel-drive power train.

A variety of bucket styles, for both round and square-bottom trenches, permits maximum production in all soil conditions. A choice of tine or solid bucket backs together with the safety trip-bucket cleaner assure all excavated material is delivered to the spoil conveyor and that the buckets are empty to accept a capacity load when next approaching the face of the cut. The conveyor is reversible and shiftable to provide positive controlled discharge.

The Parsons Company, a subsidiary of the Koehring Company.

(204) Three-Cubic-Yard Excavator

Koehring was officially launched into the production of its Model 1205 excavator. Latest and largest in the Koehring line of shovels and cranes, this new Model 1205 is in the 3-cu-yd dipper capacity class and has an established lifting capacity of 95 tons at 75 per cent rating.

According to company officials, features incorporated in the new design provide the machine with one of the greatest working ranges in this class. The standard shovel attachment combines a 30-ft boom with 22-ft dipper sticks and 3-cu-yd shovel dipper. For the crane, the basic 60-ft alloy steel boom can be extended to a maximum 180-ft length, plus an additional 30 ft of jib boom.

Power-actuated clutches on the main drums are applied by hand lever control. They provide the benefits of reduced lever pull and an unerring "feel of load" when operating with any attachment. Traction brakes are spring loaded and released by air to help reduce operator fatigue.

Other features built into the excavator include: antifriction bearings on swing and traction clutches and on all constantly rotating shafts; involute splines on all shafts; self-cleaning crawler system; easily removed and

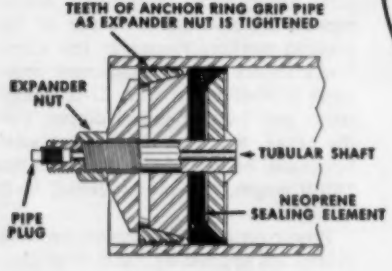
Here's a better way...

TO PLUG PIPE ENDS TEMPORARILY

In Order To:

- REPAIR PIPING
- ADD FITTINGS
- TEST PIPING & VESSELS
- PROPEL PIGS BY COMPRESSED AIR

*COLD WATER, NON SHOCK TEST MADE IN 12¾" O.D. STANDARD WEIGHT LINE PIPE.


TEETH OF ANCHOR RING GRIP PIPE AS EXPANDER NUT IS TIGHTENED
EXPANDER NUT
TUBULAR SHAFT
NEOPRENE SEALING ELEMENT
PIPE PLUG

WRITE FOR BULLETIN AND PRESSURE RATINGS OF ALL SIZES

T.D. Williamson, Inc.

P. O. BOX 4838 TULSA 9, OKLAHOMA

REPRESENTATIVES: Houston • Pittsburgh • Plainfield, N. J. • Amarillo • Casper • Provo, Utah • Joliet, Illinois • Los Angeles • San Francisco • Bartlesville, Okla. • Edmonton • Toronto Calgary • Buenos Aires • Durban, Natal, South Africa

grooved drum lagging. In addition, unit is fully convertible from shovel to lift crane and dragline or clamshell operation, handling buckets of 3 to 4-cu-yd capacity, depending on digging conditions. Total weight of the machine is 179,360 lb when equipped as a standard shovel and 197,015 lb equipped as a crane with 60-ft boom.

Koehring Company.

(192) Improvements in Model 190 Pipe Line Backfiller

Substantial improvements in the Cleveland model 190 Pipe Line Backfiller, include an increase of power, several refinements in the clutches and a reduction in height for easier transport. A fast efficient backfiller under even the most rugged job conditions — in mud, sand and rocky soil, in swamps and hilly terrain — the "190" backfills as it travels, providing continuous operation under one-man-control.

The 460 cu in. diesel engine formerly used in the "190" has been replaced with a 525 cu in. diesel engine

which develops 93.5 hp at 1500 rpm. The previous engine developed 71 hp at 1200 rpm.

To simplify its transport on low-bed trailers, the over-all height of the "190" has been reduced from 9 ft 10 in. to 8 ft 6 in. Length of the machine is 15 ft and over-all width, not including the boom, is 8 ft. The model 190 weighs approximately 24,000 lb.

Backfill clutch lever linkages of the 190 have been improved, permitting easier, more accurate control of the well-balanced 1000 lb backfill board. Refinements in the backfill winch clutches provide more rapid dissipation of heat, resulting in smoother clutch action and an increase in the wear life of clutch linings.

The Cleveland's long wide crawlers give it a low ground-bearing pressure of 5 lb per square inch with 24 in. shoes. The modern crawler unit has double-rimmed sprockets, wheels and rollers — anti-friction bearing mounted — eliminating track packing and effecting greater stability. Special spacer washers have been added to the track

adjusting bolts which greatly increase maintenance-free track life.

As a side crane the "190" has a 50,000 ft-lb capacity — 10,000 lb 5 ft from the edge of the crawler, 5000 lb 10 ft from the edge of the crawler. Its spring-cushioned winch drum hand brake provides steady control for crane work.

The Cleveland Trencher Company.

(195) New Half-Yard Shovel

Baldwin-Lima-Hamilton has introduced a new one-half cubic yard power shovel, 13 to 15-ton capacity crane, known as the Lima Type 24 Jobmaster.

Representing the smallest unit in the Lima line, which includes a six-yard shovel and 110-ton crane, the new machine is available with crawler or rubber mountings and is readily convertible to shovel, crane, dragline or pull-shovel application. On a truck or wagon mount, the Jobmaster crane has a lifting capacity of 15 tons at 10-ft radius. As a crawler crane, it has a lifting capacity of 13 tons at 10-ft radius.

This streamlined, air-controlled unit, designed for mobility, high output, speed, and low-cost maintenance, employs machine-cut gears; large-diameter brakes and clutches in the hoist; crowd and retract and swing and propel mechanisms; independent boom hoist with engine-controlled, boom-lowering, differential tractor-type steering; independent combination chain and cable crowd and retract; internal-external tooth jaw clutch for quick engagement and minimum backlash in gear train; liberal use of anti-friction bearings; heat-treated ground shafting, and floating steel disc-type dirt seals in tread rollers. Optional features include inde-

To: THE PETROLEUM ENGINEER

P. O. Box 1589, Dallas

CHANGE MY ADDRESS, beginning

with the_____issue,

FROM:_____

_____

_____

TO:_____

_____

_____

. . . Providing Distinctive Field Homes at any location . . . on any project . . . with time-proven record of Dependability.

Over 35 years of home construction across the nation has enabled Whitmor Homebuilders to provide many industrial companies with site fabricated field homes. Field personnel enjoy the same high quality standard maintained by Whitmor homes wherever installed. To sample a few locations — Butte Pipe Line Company in Montana; The California Company in Venice, La., Texas Eastern Transmission Company in Chambersberg, Pa. Investigate the Whitmor "Lease-Rental" plan for your next housing project.

WHITMOR HOMEBUILDERS INC.

INDUSTRIAL HOUSING | THE FINEST IN THE FIELD

5825 EAST 15TH STREET • BOX 5037—TULSA, OKLA. • PHONE [illegible]

pendent propel, auxiliary third drum, and power-load lowering.

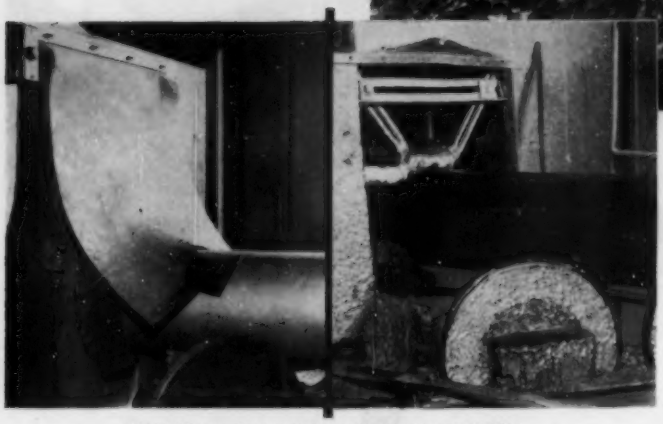
Maximum overall length of the standard crawler truck is 10 ft, 2⅛ in. and the overall width is 8 ft with 16-in. treads. The machine is equipped with four conical rollers, two in front and two in the rear with standard crawler truck. A wider and longer crawler truck is available for special work requiring greater ground-bearing area. Three tread widths are available. Six conical rollers, four in front and two in the rear, are on the rubber-mounted units and on machines with the large trucks. Conical rollers are mounted on anti-friction bearings.

As a shovel, the Jobmaster is equipped with a 16-ft 6-in. boom and 13-ft 3-in. dipper handle. Crane booms, pin or bolt-connected, with all-purpose point shaft are available from 30 to 80 ft. A 10-ft jib is available.

Counterweight combinations are readily removable. Diesel or gasoline power plants are also available.

Baldwin-Lima-Hamilton Corporation.

YOU CAN JEEP ENAMEL BUT NOT ITS BOND

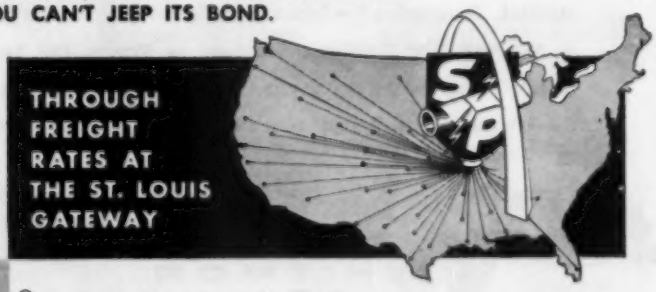


WARM PIPE LEAVING WHEELABRATOR AND PRIMING BOOTH IN TEMPERATURE CONTROLLED ROOM.

In SPI's plant, all moisture, rust and scale is removed from your pipe by warming and steel grit cleaning in temperature controlled rooms. The primer is applied immediately to seal out all dirt, dust and moisture. The steel grit cleaned surface of the clean, dry pipe, made up of many tiny facets, provides ideal and long lasting bond of the enamel to the pipe.

Field conditions prohibit such exacting procedures. Wire brushing does not produce the many tiny facets needed to provide ideal bond. Moisture may condense on cold pipe and dirt and dust carried by the wind may collect on it before the primer is applied. When the pipe is jeeped, this dirt and moisture may not show up as holidays, but later, when field c/w pipe is underground, costly holidays may result because of poor bond.

REMEMBER, YOU CAN JEEP ENAMEL BUT YOU CAN'T JEEP ITS BOND.



SP®

standard pipeprotection inc.

3000 SOUTH BRENTWOOD BLVD. • ST. LOUIS 17, MISSOURI

EVERYTHING THE GAUGER NEEDS

QUALITY WLW SERVICE

Every item in the Walker line is guaranteed to please you. Write today for our catalog which gives complete data on:

WALKER-TULSA OIL THIEF

CENTRIFUGE MACHINES

Standard and Heated

GAUGING TAPES

CARRYING CASES

AND MANY OTHER ITEMS

"Everything the Gauger needs from one dependable source."

W. L. Walker Co.

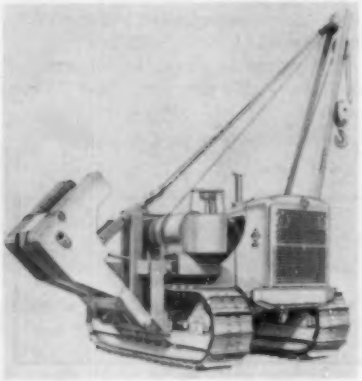
Phone: Diamond 3-8241

1009 South Main Tulsa, Oklahoma

(203) New Sideboom Tractors

Three long track, rigid beam crawler tractors are in the Allis-Chalmers line providing tailor-made equipment for pipe line work. These are the HD-11F, a 22,134-lb crawler; the HD-16FC, a 34,102-lb crawler; and the 47,000-lb HD-21F, all powered by Allis-Chalmers diesel engines.

Matched to each is a Tractomotive sideboom with hydraulically controlled extendable counter weights. Load-lifting capacity ranges up to 40,-200 lb for the HD-11F, up to 77,500 lb for the HD-16FC and up to 127,000 lb for the HD-21F, based on four feet overhang from outer track rail on each.



Both the HD-21F and the HD-16FC are equipped with hydraulic torque converter drive. In both, full horsepower is available even at 1/10 mph, permitting it to match speed perfectly to slow-paced doping, wrapping and other equipment. The operator is then free to concentrate on boom work and control signals without having to shift constantly to the correct gear.

Allis-Chalmers Manufacturing Company.

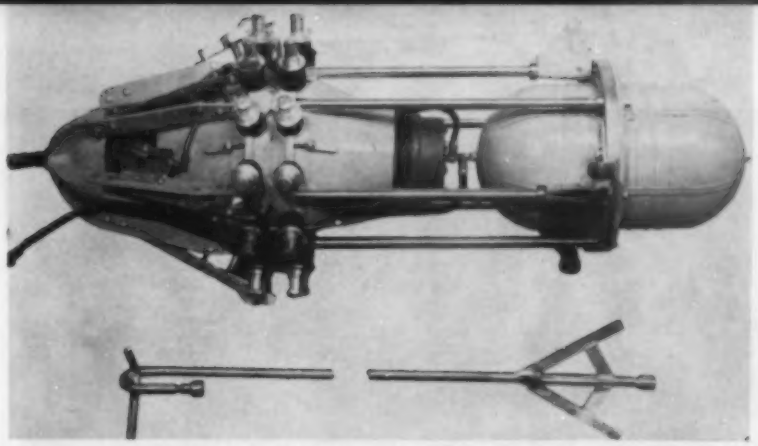
(198) Pneumatic Line-up Clamp

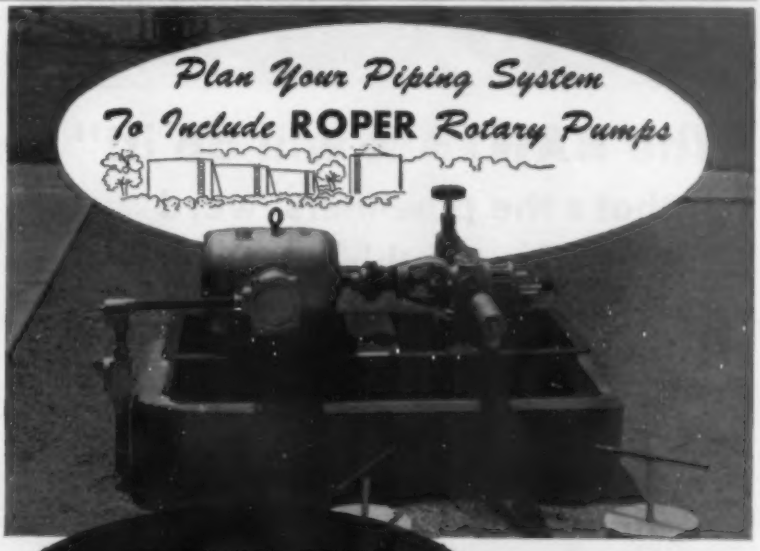
The Perrault Pneumatic, Self-Aligning, Inside Line-up Clamp is in reality two separate air-actuated clamps built into one piece of equipment.

Each clamp has its own air cylinder from which the pressure travels through lever arrangements to a ring of studs that contact the inside of the pipe at intervals of about 3 in.

In operation, the clamp is pulled through the pipe by means of a long handle that doubles as a supply line for the compressed-air tank located in the clamp. The clamp can be controlled from the end of the handle or at the clamp itself.

In practice, the clamp is pulled through the pipe until the back row of studs is in position. The back clamp is then expanded, bringing the end of that section of pipe into perfect-circle shape. A new section of pipe is then brought into position over the handle, the front clamp being expanded when the proper spacing is obtained.





Throughout the oil world there are thousands of Roper Series F Pumps on the job. Big reason is *dependability*. Other reasons include: smooth, non-pulsating flow . . . equal size gears running in axial hydraulic balance . . . positive displacement requiring no priming . . . and importantly, four-port design. This latter feature of the Roper Series F Pump allows greater flexibility of installation . . . cuts installation time and costs. Four-port design, you see, permits 8 optional piping arrangements — 4 for CW and 4 for CCW operation. There are other Ropers in the line . . . in the pumping range and pressure range you require. Ask your distributor for all the facts . . . he'll show you how Roper can give you better service and higher efficiency in field storage, gathering line, and tank truck installations.

Geo. D. Roper Corporation
728 BLACKHAWK PARK AVENUE
ROCKFORD, ILLINOIS

ROPER Rotary Pumps

Sales and Service in All Oil Producing Areas

This clamp is said to be the first successful air-operated clamp that will line up two sections of pipe so that:

1. The ends of both sections of the pipe are returned to the original, perfect-circle shape.
2. The centers of the two sections of pipe are in the same straight line.

This is claimed as the first clamp with which two beveled sections of pipe can be lined up and clamped in position perfect for welding in true alignment, both as to center and circumference. This can be done easily and quickly regardless of inconsistencies in diameter normal to large-diameter pipe.

Data indicate that the clamp will speed up the welding operation, make possible a better welding job, and reduce the amount of labor required for line-up work.

The clamp is available for use in connection with pipe sizes from 20 in. to 36 in.

Perrault Equipment Company.

For more information on this Equipment see page E-20a

"The BANTAM will do it!"

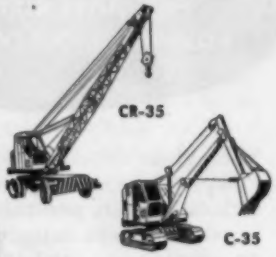
. . . that's the pipeliners' word for this job-hungry rig!

Most Mobile, Useful, Cost-Cutting Machine of All! That's the way it is with BANTAM. It's the all-purpose machine that's so versatile it gets first call for an amazing range of work. BANTAM is the right size . . . has the right capacity . . . works with the right attachments to tackle more of those right-of-way jobs, do them faster, save manpower—and get on to the next assignment.

BANTAMS cost only a fraction of larger, cumbersome, slower-moving, limited-work equipment and yet can outproduce it through easy-going travel and high-speed, sustained operation. With one BANTAM, you're set to lift, excavate, load and unload, trench, drive pile, handle pipe and bulk materials, pour concrete—and do each with money-saving speed, efficiency, safety. BANTAM's famous nine easy-change attachments give you a production setup for dozens of jobs!

Take your choice of carrier, crawler or self-propelled models. Capacities 10,000 lb. to 14,000 lb.—get 90 to 100 cu. yd. hourly production as a shovel—dig 100′ of 5′ trench an hour as a back hoe.

Get all the facts . . . see your BANTAM distributor or mail the coupon.



P-37

SCHIELD Bantam Co.

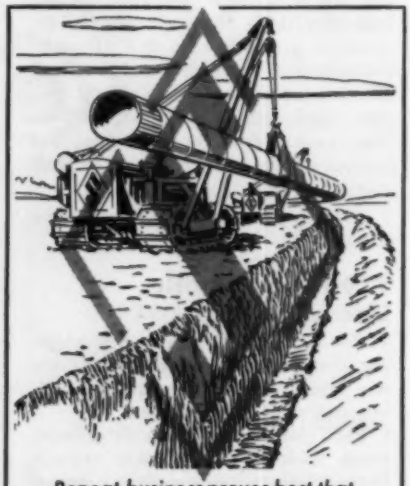
286 Park Street
Waverly, Iowa, U.S.A.

CHECK HERE . . .

_____ I want a BANTAM demonstration.
_____ I want complete BANTAM specifications, information.
I am interested in ( ) carrier-mounted, ( ) crawler-mounted, ( ) self-propelled model.
( ) crane — ( ) shovel — ( ) back hoe — ( ) dragline — ( ) clamshell — ( ) concrete bucket — ( ) backfiller — ( ) pile driver — ( ) grapple.

Name.....
Title.....
Company.....
City.....State.....

WORLD'S LARGEST PRODUCER OF TRUCK CRANES AND EXCAVATORS



Repeat business proves best that

SOMERVILLE

has what it takes to handle your next pipeline job

SOMERVILLE CONSTRUCTION CO.
Ada, Michigan

SIGN OF SATISFACTION
TRANSMISSION LINES
DISTRIBUTION SYSTEMS

(196) New Model Pipe Line Machine

A new model excavator-crane called the "Pipeliner" is currently being made by Insley Manufacturing.

The "Pipeliner" has a number of mechanical and operating features that are of specific value to the pipe line contractor. The carbody is of new, wide, deep design equipped with removable bottom cover plates. Crawler rollers and tumblers are sealed against dirt. Crawler shoes and pins are of heat-treated alloy steel. Backhoe attachment features the Insley differential drum and wide foot boom. H & L side

cutters are standard equipment for the hoe bucket.

This new excavator-crane is available with 24 or 30 in. shoes and 12 ft 6 in. long crawlers. Travel speed with single-speed transmission is .8 mph; (.8 mph and 1.6 mph) with optional two-speed transmission. Total weight as a backhoe is 40,380 lb.

Insley Manufacturing Corporation.

(197) Pipe Line survey Instruments — Mole

A new three-dimensional pipe line surveying instrument called the "mole" has recently been developed by Sperry-Sun Well Surveying to determine the exact position of lines at river crossings.

The "mole" makes a photographic film recording every 40 to 50 ft during 25-sec stops while being pulled through the line. Surveys are made in both directions. After the survey is run, the film developed, and data recorded, the survey is computed by IBM machines.

This new pipe line survey instrument consists of a gyroscopic element used to determine the direction of the line, a pendulus inclinometer to measure the deviation from horizontal, and a timing mechanism and flashing light system working in conjunction with a motor-driven 16-mm camera. It can be used in reasonably level 10-in. lines, most 12-in. lines, and any 14-in. or larger lines with only cold field bends.

The "mole" has made successful surveys ranging from 1500 ft to 9000 ft

one way. It is also used to determine how much a line has shifted, how deep is the cover, how many feet of line are bare or covered. It can indicate whether line is swinging, and whether negative buoyancy is adequate.

Sperry-Sun Well Surveying Company.

Extreme Weather Conditions?

Call for **PLICO** Engineered Pipe Enamels!

Whether you're burying your pipe in the burning sand of the Colorado desert or lowering it into a frozen ditch in the Rockies, there's a Plico Pipe Enamel that exactly suits your corrosion-protection requirements.

Many years of experience in solving underground corrosion problems for almost every major pipeline company in America give Plico coating engineers the background to lick the trickiest jobs. Plico enamels are available at strategically located plants across America, which means low freight rates to your job site. Send for complete reports on the wide variety of projects Plico has handled for some of the biggest companies in the business!

PLICO

PLICO, INC. 1566 E. Slauson Avenue, Los Angeles 11, California
Telephone: LOgan 8-4335

(201) Manually Guided, Portable Vibratory Compactor

This vibratory compactor is a highly useful machine to have around where backfill on pipe line trench must be compacted to a specified density, especially in urban area work, on some road crossing jobs not bored, or similar situations encountered during pipe line construction.

The vibratory compactor, shown in accompanying picture, is a rugged, reliable machine that has only one moving part—the shaft of the motor. It operates on 110-v, 3-Φ, 60-cycle a-c, preferably from a trailer-mounted power plant that permits varying the frequency to suit the job, simply by setting the engine governor.

Built by Jackson Vibrators, the machine is available in single, double, and multiple units. It has interchangeable bases—12 to 26 in.—and working speeds of from 0 to 60 fpm.

Jackson Vibrators, Inc.

a reputation of integrity
skill and dependability...

(236) First Pipe Line Engine Driven Compressor Centrifugal

The automatic engine-driven centrifugal compressor pumping gas on the Gulf Interstate pipe line is designed for operation without attendant labor by remote control from a parent compressor station 80 miles away.

A joint development by Gulf Interstate and Cooper-Bessemer, the Cooper-Bessemer type RFB-24 centrifugal compressor handles over 400,000,000 cu ft of gas a day at pressures up to 935 lb per sq in. The engine driving the compressor is a Cooper-Bessemer type LSV supercharged gas engine capable of delivering up to 4550 hp.

Centrifugal compressors like the RFB-24 are being considered more and more for gas transmission services. Problem, however, has been how to drive them efficiently at both full and partial loads. By the application of a new turbo-cooling principle to the supercharged 4-cycle gas engine, it is now possible to attain new ultimates in over-all economies of installation, fuel and maintenance.

The satellite station where the engine-driven centrifugal compressor is now pumping gas is on the main gas transmission line near Stanton, Kentucky. The parent station from which the unit can be remotely controlled is Clementsville, Kentucky.

Cooper-Bessemer Corporation.

Corrosion-Maintenance

(282) Malfunction Detector for Rotating Machinery

New Beta vibration monitor is claimed to anticipate and prevent trouble in rotating and reciprocating machines by responding to slight increases in roughness or vibration and causing a shutdown before a costly failure occurs.

Examples of detectable malfunctions are failing bearings, bent shafts, unbal-

ance, broken blades, ets. Applications include pumps, motors, compressors, blowers, gas engines, diesels, centrifuges, turbines, generating equipment, test stands, etc. It may be used singly on small equipment; in pairs on driving and driven equipment, or in series or parallel combinations to monitor each bearing.

Acceleration range is 0-2G's to cover all types of rotating equipment at speeds up to 18,000 rpm.

This Model 5 Vibraswitch includes a shock-free holding and reset mechanism for automatic or remote operation to prevent actuation from starting or from normal or accidental transient shocks. (These feaures have previously been available only in electronic monitors.) Unit employs no vacuum tubes or electric components and is said to be maintenance-free and fail-safe.

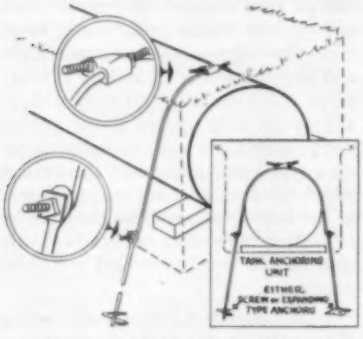
It is supplied in an explosion-proof housing for Class I, Group D; Class II, Groups F and G locations, or gasketed for non-hazardous outdoor locations. The housing is of cast aluminum threaded for ¾-in. conduit. Terminals are provided for heater resistor to prevent condensation in semi-tropical or tropical climates.

The Beta Corporation.

(215) Tank Pipe Anchor Kit

A. B. Chance is now introducing a single package assembly for anchoring underground fuel tanks to prevent "floating" when they are empty or only partially filled.

This complete package provides a new method of attachment that permits



an easy and secure installation with ordinary tools.

Package consists of two anchors, entire screw type of expandable, whichever is preferred, complete with rods for "banding" over the tank and for anchor attachment. The "banding" rods are joined over the top of the tank with a connecting lug that permits 12 in. of take up on the threaded end of each rod.

The standard package is made for 5 ft 4 in. to 6 ft diameter tanks; however, the assembly is available to fit any diameter. Number of sets to be used on a tank depends on the length of the tank; generally, a set is used for each 6 ft of tank length.

A. B. Chance Company.

(224) Coated Tape for Joints and Fittings

L.O.F Glass Fibers reports that it has introduced a coated tape for field wrapping of joints and fittings on underground pipe lines that is said to be comparable to the coating used in the over-all wrapping operation.

The company has been offering a product called Duratape, which is a glass fiber mat coated on both surfaces. Previously, however, Duratape was coated only with coal tar. The new product coating asphalt. Thus L.O.F Glass Fibers can provide either coating to conform to this coating applied on the main body of the pipe.

One of the company's important developments this year is the great increase in tensile strength that has been imparted to Duratape. The figure has been raised from 29 lb per inch of width to 55 lb per inch.

L.O.F Glass Fibers Company.

Plico Insulating Spacers
assure lowest permanent cost!

When you compare spacer values, look for the spacers that combine lower primary cost and reduced pipeline cathodic protection maintenance cost to give you lowest overall cost. Feature for feature, superior Plico Insulating Spacers are your best buy.

1 One-piece extruded liner is made of 100% virgin duPont Neoprene. High resistance to cold flow and high dielectric strength assure permanent protection to carrier line.

2 No center gaps or split liners to permit coating displacement or leakage of current to metal portions of spacer.

3 Multiple longitudinal ribs* act as a gripping tread, prevent slippage during installation and frictional displacement of coating (cold flow) after installation.

4 Extruded liner lips prevent movement of liner on heavy gauge steel band.

5 Rugged construction to withstand installation shock loads and post-installation static load. Plico Spacer bands are cold-formed of 12-gauge steel in 12" diameter and larger, and of 14-gauge steel in 10" diameter and smaller. Band widths are 6", 8" and 12".

6 Skids of heavy-duty, high-density laminated Micarta, accurately spaced and securely fastened to the band, provide high dielectric strength and abrasion resistance and assure the extra safety factor of double insulation.

Illustrated above is the Plico Type 506WM spacer, with wedge for speedy and positive closure. Bolt-closure is also available as shown at left (Type 512M).

*Patents Pending

Write for Plico Engineering Data Manual

PLICO

PIPELINE COATING & ENGINEERING CO., INC.

1566 E. Slauson Avenue, Los Angeles 11, California

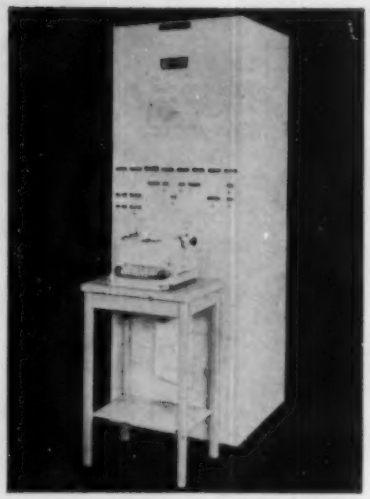
(226) Digital Telemetering Developed for Pipe Line

During the first few months of 1956, Union Switch & Signal developed a means of digitally telemetering and automatically recording data from remote locations such as pumping stations.

This makes possible Union CTC (Centralized Transport Control) systems with either of two telemetering methods. One, the conventional analog telemetering and the other a digital telemetering method.

With this innovation, variable information to be transmitted is picked up at the transducer in digital form and becomes an integral part of the Union CTC code system. The data are protected from noise or false signals the same as the controls and indications. By assigning steps in the code to the different combinations of figures on a decimal basis, information can be transmitted in three or four significant figures using comparatively few steps in the code. Error in the transducer can be limited to values within one quarter of one per cent plus one tenth of one per cent resolution.

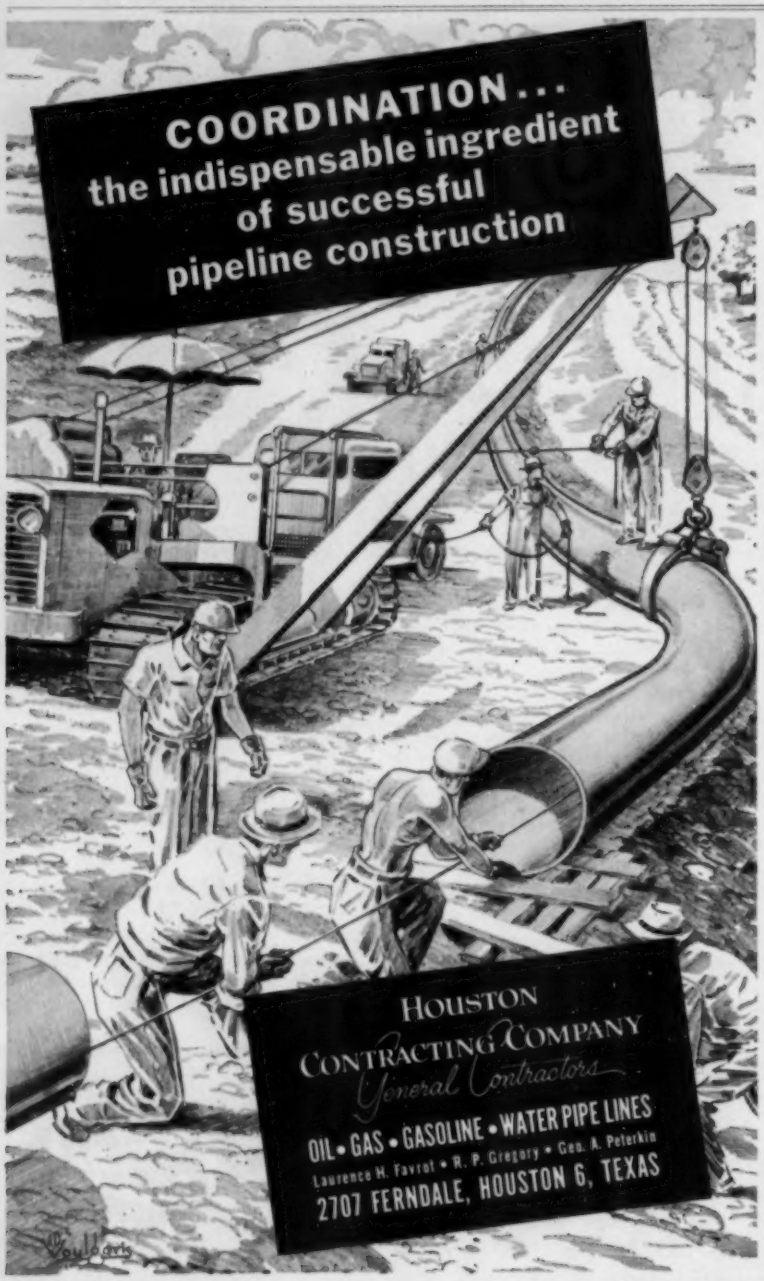
System offers a large number of possibilities for read-out at the central location. Data may be displayed numerically, automatically logged on a typewriter, stored for retransmission over standard teletype equipment, fed into computers, punch tape, or converted back to analog for trend recording.



On the first system completed, which was on a single-station basis, data were automatically logged on a typewriter. The telemetered information is programmed on a periodic time basis, initiated on demand, and also initiated by upsets either on a rate of change or cumulative basis.

Another system has been designed and built in which the same information is taken at a number of pumping stations along a multiple-line system. The data in this system include discharge, case and suction pressure, flow and positive displacement meter readings. This information is automatically and simultaneously racked-up at every point along the line, transmitted digitally in the code system to the central point, stored and automatically logged on a typewriter along with the time at which the data were automatically read at the field locations. This provides information heretofore not readily available to the dispatcher and operating personnel.

Union Switch & Signal, a division of Westinghouse Air Brake Company.



(222) White Pipe Felt

Nicolet Industries is now marketing "Reflecto," a white neoprene saturated asbestos pipe line felt.

The felt has parallel glass strand reinforcement on one-quarter inch centers. A second version, "Reflecto Supreme" has glass scrim, a reinforcement on one-quarter inch spacing, vertical and horizontal. This is said to be the first practical wrapping material to reduce the effects of the sun's rays on

Experience can keep you out of trouble in fighting corrosion, too.

Why gamble with "unknown quantities" when it comes to protecting pipe, pipe joints, couplings and other vulnerable surfaces above and below ground?

Since 1941, TAPECOAT, the quality coal tar coating in handy tape form, has demonstrated its ability to withstand corrosion year after year. In case after case, TAPECOATed lines have been dug up after 10 years of service *with no signs of deterioration on the pipe surfaces uncovered.* That's why TAPECOAT is specified by those who know that continuing protection is the first consideration.

Everything considered, you'll be money ahead by using TAPECOAT to give you the quality protection you need for reduced maintenance and replacement cost.

Write for brochure and prices.

The TAPECOAT® *Company*

Originators of Coal Tar Coating in Tape Form

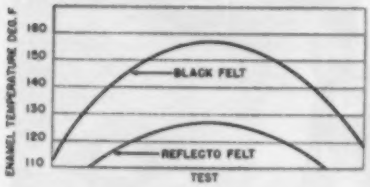
1533 Lyons Street
Evanston, Illinois

enamel. It is claimed to eliminate the need for white washing and the use of Kraft paper.

Picture shows two barge loads of coated and wrapped pipe using Reflecto Felt.

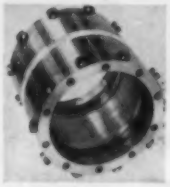
Chart shows temperature of enamel reduced as much as 30 deg with Nicolet Reflecto Felt, based on tests of an accredited, independent research organization.

Nicolet Industries, Inc.



(212) New Packing Permits Welding Hot Pipe Line

Pipe line Development has a newly developed, special high-temperature resistant packing ring.



Now company's Weld + Ends couplings may be used on much higher temperature pipe lines.

Weld + Ends couplings have been in common use during the past several years for making tie-ins on crude oil, gasoline, and natural gas pipe lines. However, their application has been somewhat limited by the heat-resistance properties of the synthetic rubber packing rings.

The newly developed packing rings have been tested to pressures of 1500 psi at 1000 F on oily steam pressure. Pressure-temperature applications may be determined by the ratings of the standard codes for mild-carbon steel pipe. Special couplings can be supplied on order, made of carbon-molybdenum or chromium-molybdenum steels where higher pressure-temperature ratings are required.

Now hot oil, hot asphalt, steam, and other hot-process pipe lines can be rejoined and welded while in-flow at higher temperatures than previously possible, according to the manufacturer.

Weld + End couplings can be furnished in sizes 2 in. through 36 in.

Pipe Line Development Company.

Fast...Handy Fact Books...on RCA ELECTRON TUBES!

. . . If your company works with electronic equipment, these three RCA Booklets will save you time when you want technical facts about tubes. They give valuable information on hundreds of the RCA tube types manufactured for use in industrial electronics, and lab equipment.

RCA Power and Gas Tubes (PG-101B)—contains descriptions, terminal connections, technical information on RCA vacuum power tubes, rectifier tubes, thyratrons, ignitrons, magnetrons, and vacuum-gauge tubes. The most up-to-date booklet of its kind in the industry.

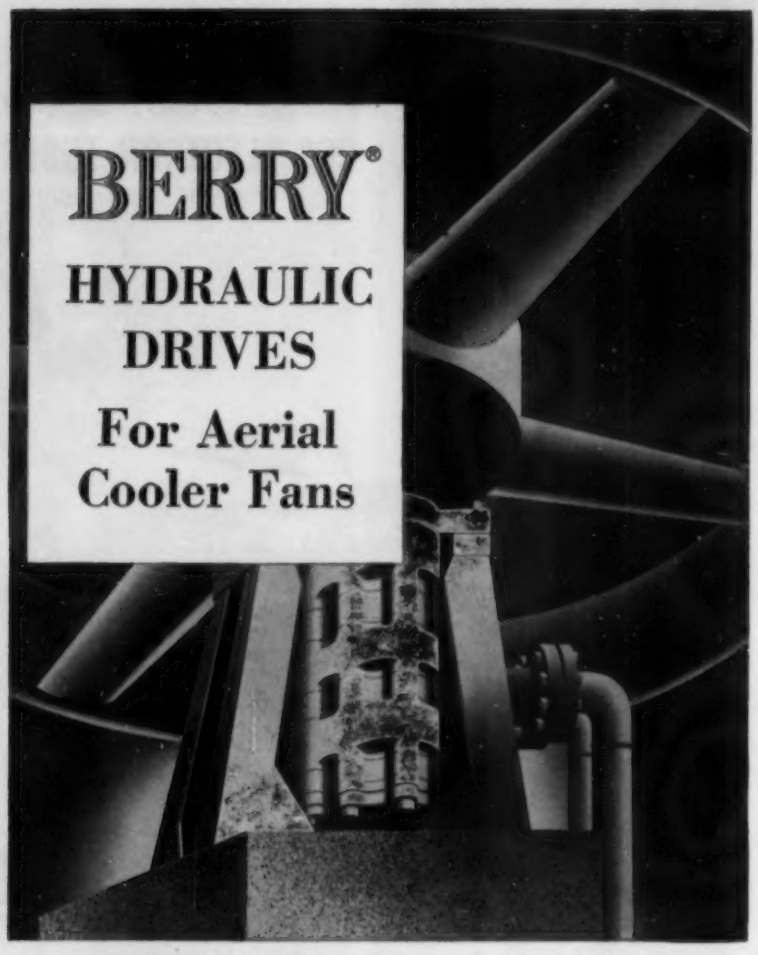
Receiving-Type Tubes for INDUSTRY and Communications (RIT-104)—includes technical data, socket-connection diagrams, and descriptions on RCA Special Reds, premium, computer, pencil, glow-discharge, small thyratrons, low-microphonic, and other tube types especially suited to industrial electronics.

RCA Photosensitive Devices and Cathode-ray Tubes (CRPD-105)—gives descriptions and technical details on RCA single-unit, twin-unit, and multiplier phototubes; TV camera tubes; special kinescopes; oscillograph tubes, and other types for industrial electronics and laboratory equipment.

SEND FOR THESE BOOKLETS TODAY! Write on your company letterhead to RCA, Commercial Engineering, Section 27-T, Harrison, N.J.

RCA® **TUBES FOR INDUSTRY**
Radio Corporation of America
Harrison, N. J.

RCA ELECTRON TUBES . . . LONG-LASTING, DEPENDABLE . . . AVAILABLE THROUGH YOUR AUTHORIZED RCA TUBE DISTRIBUTOR.



BERRY®

HYDRAULIC DRIVES

For Aerial Cooler Fans

CHECK THESE ADVANTAGES

constant water temperature • The Berry drive makes it possible to maintain a predetermined jacket-water temperature accurately and automatically.

safe • The Berry hydraulic system has the safety necessary for gas transmission equipment and can be located in compressor building at point of use.

simple, trouble-free • Fan may be mounted directly on Berry hydraulic motor shafts, and the pump may be direct or belt driven from compressor flywheel.

saves power • With the Berry hydraulic drive, horsepower used to drive fan is proportionate to the cube of the speed of the fan. Whereas with a mechanical drive, the horsepower remains constant.

complete • System may be designed to integrate compressor and auxiliaries into a packaged unit. Compressor unit may be moved from location to location as needs increase or decrease, without interrupting station operation.

adaptable • With Berry's "stacking" design, *one* Berry hydraulic pump can provide power for a number of Berry motors under various oil flow and pressure requirements.

low overall investment • The integrated hydraulic drive, powered from compressor, eliminates hazardous electrical equipment and additional buildings necessary.

fully automatic • When untended service is a "must," Berry drives can be integrated with other controls to provide automatic compressor stations.

See how Berry fills your needs.

Write for this 8-page bulletin which gives full data on Berry pump/motor "package" units.

BERRY DIVISION

OLIVER IRON AND STEEL CORPORATION

PITTSBURGH 22, PA.

Communication –Instrumentation

(227) New Unit Provides Maximum Flexibility in Microwave Channel Stacking

The new RCA type MV-124 frequency-division, voice-multiplexing equipment provides increased flexibility in communications system planning.

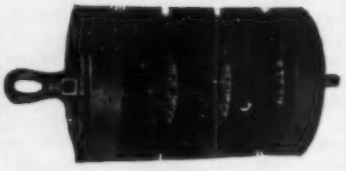
This equipment features a double heterodyne process that enables a

channel unit to be located at any assignment in the baseboard spectrum from 10 kc to 130 kc by merely inserting a proper plug-in crystal unit. No group modulators are required for 24 or less-channel system. Additional 24-channel groups can be stacked to provide higher capacity systems.

Single sideband-suppressed carrier techniques are used to supply 24 chan-

MOLE

Pipeline Cleaner



for BETTER cleaning of

CRUDE LINES

PRODUCT LINES

NATURAL GAS LINES

FOR DETAILS WRITE

Pipeline Cleaners Co.

Fort Madison, Iowa

nels. The simultaneous transmission of many channels of intelligence is accomplished by modulating separate sub-carriers spaced uniformly throughout the baseband modulation spectrum. Channels are stacked one above the other in the available modulation bandwidth. In other frequency division systems, a specific channel unit is required for each channel assignment. In RCA MV-124 multiplex systems, however, stacking is simplified because all channel units are identical.

RCA multiplex channels are claimed to easily meet today's constantly changing requirements of industrial operations. Interchangeable units are easily rearranged to follow changing operational schemes — including new routing requirements and increased or decreased channeling requirements with changing loads.

A wide variety of termination options are available. Self-contained, four-wire to two-wire hybrid with adequate patching facilities are provided. Rack cabling is reduced to a minimum, while standard cables with plugs permit adding channels in the field. Some of the many signaling options readily available are listed in the specificatons.

Radio Corporation of America.

(228) Electronic Valve Controller

The E-I-M Company introduced its modern control for electrically operating valves in the spring of 1950. This control pioneered the patented replacement yoke nut, providing external change of seating range as well as vernier adjustment throughout the seating range.

It made torque protection available in both the closing and opening directions. It allowed positive handwheel operation under lack of power conditions by building the patented shifting mechanism in a separate housing between

The WILKINSON LINE LOCATOR

SEES AND TELLS

Instantly locates subsurface pipes, cables and such, and determines depth accurately. The etched circuitry, our latest innovation, assures better quality control and performance than the customary hand wiring method.

Avoid damaged structures and prevent loss of time with the Wilkinson Locator.

A new loop antenna increases power and selectivity. Instrument cases are now built of wear resisting phenolic material.

WILKINSON PRODUCTS COMPANY

3987 Chevy Chase Drive, PASADENA 3, CALIFORNIA. SYlvan 0-4314

NOTICE: No change except the corporate name. We still have the same ownership, same management, same address, same telephone, and use the same 45 years of experience to render the same service under the same trade name—"PELCO."

Specify **PELCO** Welding Saddles

PELICAN SUPPLY CO. INC.

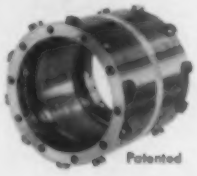
P. O. Drawer 1108 Shreveport (84), La.

SEE YOUR NEAREST SUPPLY HOUSE

(Formerly: Pelican Well Tool & Supply Company)

Safer...Quicker Pipeline Repairs

WELD + ENDS Permits Welding a Pipeline While Pumping Through It



A pipeline safety welding coupling for crude oil, gas, gasoline, asphalt, steam, chemical process and other pipelines. WELD + ENDS joins pipe securely so flow can be resumed immediately at full pressure. Welding can be performed while pipeline is in use days or weeks later. Sizes 2" to 36".

• • •

Smith + Clamp Permits Plugging and Welding Pit-Hole Leaks in a Pipeline While Pumping Through It

Smith + Clamp shuts off more easily, quickly and safely than ordinary clamps. Use on high and low pressure gas, gasoline, crude oil, water, steam, air, chemical process and other pipelines. Sizes 1" to 30". Combine with WELDPLATE when pipe reinforcement is specified.

Write today for complete information on these latest developments in safer, quicker pipeline repairs: Weld + Ends and Smith + Clamp. Address Dept. B12.

THE PIPE LINE DEVELOPMENT CO.

5700 DETROIT AVE., CLEVELAND 2, OHIO

"Phil, what will we have to do to get dry gas?"

"There's just one thing to do! Call in Pritchard."

"Why, Pritchard?"

"Two reasons. First, designing and building natural gas dehydration plants is one of Pritchard's specialties. Second, when Pritchard says 'dry', they mean *dry*."

"Haven't we worked with Pritchard before?"

"Yes, and they certainly surpassed our expectations. When they assume the responsibility for a gas dehydration project, you can be sure that the job will get done faster and you will get into production quicker."

"Looks like you have the answer to our problem, Phil. Now there's just one thing to do."

"What's that?"

"Get on the phone and call Pritchard!"

J. F. PRITCHARD & CO.
4625 Roanoke Parkway, Kansas City 12, Mo.

"Phil, what will we have to do to get dry gas?"

Pritchard experience in building dehydration plants is your assurance of success!

The gas industry has grown to respect Pritchard for the engineering and construction of dehydration plants.

When Pritchard designers say "dry", they mean *dry*.

And they are capable of following up with construction that stands the test . . . and you can be assured of greater production for your operation.

Let Pritchard solve your gas treating problems. Consult Pritchard on your next dehydration plant!

INDUSTRY'S PARTNER FOR PROGRESS

J.F. Pritchard & Co.

ENGINEERS • CONSTRUCTORS

Dept. 535 4625 Roanoke Parkway

Kansas City 12, Mo

SERVING THE GAS, POWER, PETROLEUM AND CHEMICAL INDUSTRIES

BOSTON, CHICAGO, BUFFALO, HOUSTON, NEW YORK, PITTSBURGH

the motor and power housing, and many other features not previously available.

E-I-M, after four years of shop and field testing, now introduces the E-I-M Electronic Valve Controller. This is said to be the first power operator for electrically operating all types of valves to incorporate a miniature all-electronic control system. This fully flexible control system utilizing a-c, d-c, motion inputs, as well as conventional primary elements, is most suitable for process instrumentation and power instrumentation, and is particularly adapted to pipe line compressor station requirements, pipe line pumping station, metering station requirements, etc.

The all-electronic control system is inherently sensitive and makes feasible narrower proportional bands, faster reset settings, increased rate of response, and eliminates the time lag problem.

Units are adaptable for readout, cascading, computer, and similar systems. The smallest of the elements permits complicated control systems in the minimum of panel board space. Transmission distances of great length are permissible without lag, and it is possible to tie in with leased wire, microwave, and other metering systems.

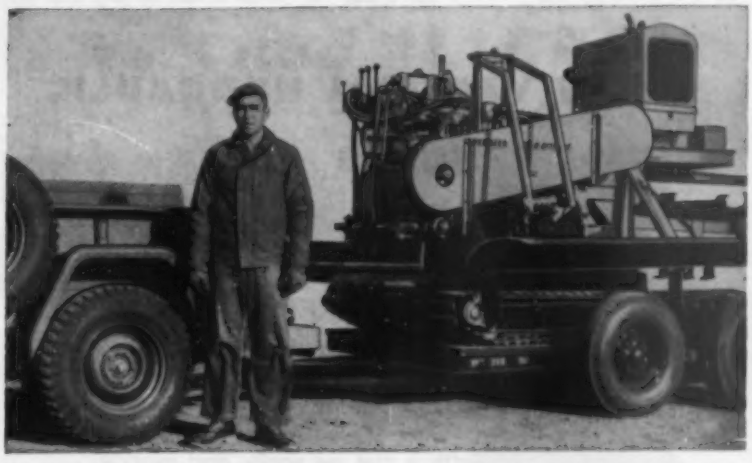
The sensing device or transmitter

can be used to transmit measurements of differential pressure, pressure, temperature, liquid level, gas analysis, flow, pH, etc.

Most important feature has been the ability of E-I-M to utilize its standard valve control, modified for use with a miniature all-electric control system and suitable for most any type of instrumentation.

E-I-M Company, Inc.

"DIGS MORE DIRT FOR LESS MONEY THAN ANY OTHER DITCHING MACHINE"*



***Says Roland Kniepkamp of Mascoutah, Ill.** "I am now using my third 524T Pow-R-Ditcher. I don't believe there is another machine that will dig as much dirt for the money invested. My trenching business has increased and I have taken a lot of work away from competitive machines. For satisfied customers and economical trenching you can't beat the "Pow-R-Ditcher."

WRITE FOR COMPLETE INFORMATION AND DISTRIBUTOR NAME

Model 524T digs 8" to 24" wide at speeds of 1' to 15' per minute. Self propelled, rugged, highly manueverable. Excellent for foundation footings, gas, water and sewage lines. Easy to transport. "The BIG ditcher with the low price." Smaller models available.

Some Excellent Sales Territory Available

VERMEER MANUFACTURING CO. **PELLA, IOWA**

INTAKE FILTERS
Write for Bulletin 100

PIPE LINE FILTERS
Write for Bulletin 200

LIQUID FILTERS
Write for Bulletin 300

HYDRAULIC FILTERS
Write for Bulletin 330

VENTILATION FILTERS
•
Automatic Filters
Write for Bulletin 500
•
Dry Type Filters
Write for Bulletin 600
•
Viscous Panel Filters
Write for Bulletin 700
•
Electrostatic Filters
Write for Bulletin 400

THERE IS A
STAYNEW
FILTER
FOR EVERY
INDUSTRIAL NEED

Model CPHS—Pipe Line Filter

WRITE FOR BULLETINS

Give Bulletin Number for complete information on any specific filter.
We also design all types of special filters. Consult Dollinger engineers . . . no obligation.

Representatives in Principal Cities

DOLLINGER
PROTECTED MOTOR
STAYNEW FILTERS

DOLLINGER
CORPORATION
2 Centre Park • Rochester 3, N. Y.

ALL TYPES OF FILTERS FOR EVERY INDUSTRIAL NEED

The ALSTON Pipe Cutter
is SAFER
saves TIME
and MONEY*

*Say hundreds of pipeline workers using the Alston Ratchet Pipe Cutter.

safer

The Alston Pipe Cutter completely eliminates sparks . . . no line explosions. No more time consuming pipe bleeding.

quicker

This tool cuts 10-inch pipe in less than 15 minutes. Roller guides eliminate broken cutters. The ratchet makes working in close places easy.

saves money

Begin to use this precision made cutter in your pipeline operation for safer, quicker, economical pipe cutting. Write for literature and prices.

ALSTON
Manufacturing Co.

Livingston, Texas
P. O. Box 707 Ph. 226

Here it is-from CINCH

NEW VERTICAL HYDRAULIC
PIPE BENDING
MACHINE

It's the **only vertical hydraulic** pipe bender in the business . . . designed to save you time and money on the line. It's lighter . . . more compact . . . and faster. Since it's not overweight, overheight or overwidth it can be easily and quickly transported on float truck without removal of tracks.

Two sizes: 16" through 30"; 22" through 36". Already proven in field on 36" line over rough terrain in Georgia and North Carolina. You must see the new Cinch Vertical Hydraulic Pipe Bending Machine in action to appreciate its time-cutting, money-saving benefits.

It's a Cinch...Cinch Machines are used by the leading Pipeline Contractors.

CINCH
PIPELINE EQUIPMENT, Inc.

7020 Long Drive Phone: MI 5-2484
Houston 17, Texas

Vents and Markers are frequently supplied for "Oil" and "Products" lines. *Photograph by permission of representative customers.*

WRITE OR PHONE *for the last word in VENTS and MARKERS*

Fleet-Line Vents and Markers are a sound investment in good public relations. They truly dress up your pipe line.

Yet they are relatively inexpensive. The Vents are priced to compete with those commonly fabricated from pipe.

Your company emblem, name or initials can be cast integral. An interchangeable brass plate on the reverse side can be used for mile-post and other data.

Painted in your company colors, or unpainted.

Standard sizes for slip-fit on pipe: Vents 4″, 3″, and 2″; Markers 2″.

Supplied for solid fillet weld, or with countersunk Allen head screws.

Fleet-Line Vents and Markers are standard equipment with many pipe line companies in the United States and Canada. Write or phone now for specifications folder and price list.

Patented. Trade Mark Registered U.S. Patent Office.

Back views of Vent and Marker show location of brass identification plate.

FLEET-LINE®
COMPANY

P. O. Box 276A
50 Fannin Street
Shreveport, Louisiana

IS THAT LINE EXACTLY WHERE YOU PUT IT?

THE "MOLE" CAN TELL YOU WHERE IT IS NOW

BESIDES LOCATING RIVER CROSSINGS EXACTLY, THE "MOLE" MAY GIVE ANSWERS TO THESE QUESTIONS:

Has the line shifted?
How much has it moved?
Does a line shift gradually?
What makes a line break?
Is the negative buoyancy ample?
Is the line swinging?
How many feet of line is bare or covered?
How deep is the cover?
Is the line safe?

The "Mole" is a three dimensional pipeline surveying unit making photographic film recordings ordinarily every 40' to 50' during 25-second stops. Surveys are made of both directions of the line. After the survey is run, the film developed, and data recorded, the survey is computed with IBM machines.

The dimensions of the "Mole," 66" overall by 7¾" diameter, allows it to be used in flat 10" lines, most 12" lines, and any 14" or larger lines with only cold field bends. "Mole" surveys have ranged from 1500' to 9000', one way, with good results in each survey.

Write for complete information on the "Mole" that can tell you exactly where your pipeline is now.

SPERRY-SUN

SPERRY-SUN WELL SURVEYING COMPANY

3118 BLODGETT AVENUE • HOUSTON, TEXAS

BRANCH OFFICES

Corpus Christi, Odessa, Marshall, Wichita Falls, Texas • Lafayette, Westwego, La. • Long Beach, Bakersfield, Ventura, Calif. • Oklahoma City, Okla. • Casper, Wyoming

(246) New Aerial Markers Aid Pipe Line Patrol

Pipe line companies now using or planning for aerial patrol of their system can now obtain all aluminum aerial markers for easy identification of their lines. Markers, manufactured by L & M and distributed by Tod Pazdral Pipeline Specialties, Houston, Texas, feature a cast aluminum frame with heavy sheet aluminum face plates

and individually cast aluminum numbers riveted to the plates. Big 11 in. numbers, and the face plates are available in several sharply contrasting color combinations.

Markers are shipped assembled ready for mounting on supporting posts, thus saving much time and expense in the field. Mounting brackets are made to fit any type supporting post specified. Once installed, the aluminum markers need no maintenance. The frame work and underside of plates will never need painting.

This combination of quick installation and maintenance free service is a real factor in considering over-all costs of marking a pipe line for aerial patrol. For pipe lines presently marked but needing new face plates, the L & M plates and numbers can be purchased separately for mounting in the field on existing support frames. A choice of any two-color combinations desired may be specified.

The plates are made from alloy 6061-T6 aluminum sheet; 0.081 in. thickness, and are finished with baked enamel and reflective beads. The aluminum used in the frames and numbers is Tenzaloy, ASTM Specification No. B 179-51T alloy ZC81A. The aluminum is anodized to give additional protection against oxidation.

L & M Company

(250) New Desiccant for Drying LPG Products

Minerals & Chemicals Corporation announces a new low-cost, activated bauxite desiccant specifically developed to overcome souring of LPG products during the final drying step. Name of the material is Driocel S.

In the final drying of light-hydrocarbon liquids such as LPG products with ordinary desiccants, a condition of sourness frequently is found. This is true even though the charge liquid to the dryer may test sweet. This condition is due to the presence in the feed of trace amounts of certain organic sulfur compounds that have escaped the prior processing and are subsequently decomposed under dryer operating conditions, liberating sufficient H_2S to give the sour reaction. It is difficult to predict whether such a condition may occur.

M & C reports that in cases where difficulties of this type have been encountered, the use of Driocel S has corrected the sour condition and a sweet dried product has been obtained every time. In addition, the desiccant does not act as an acid polymerization catalyst toward heavy ends of the liquefied gases. As a measure of long desiccant service life, initial installations put on stream over two years ago are still operating. Specific properties of this new drying agent, the company states, also suggest its use in the drying of chlorinated and fluorinated hydrocarbons.

Driocel S is made in 8/14-mesh size —a grade best suited for liquid drying work. It is packed in returnable sealed steel drums containing 400 lb net each.

Minerals & Chemicals Corporation of America.

FIRST

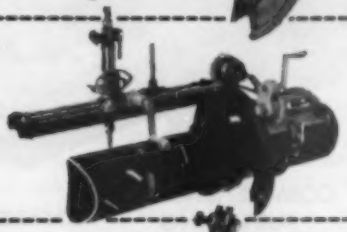
Choice for Pipe Cutting and Beveling Equipment

Mathey

PIPE CUTTING & BEVELING

Quick, easy operating. Just slips over pipe, no hinges or latches to open or close. Light weight reduces fatigue factor. Clean, accurate cuts.

Sizes 1 to 5 for Pipe 4" to 36" diameter. No. 5 machine available with optional closed gear section, insertable after pipe machine is slipped over pipe.



SHAPE & COUPON CUTTING

For cutting pipe to weld angular intersections to job requirements. Coupon cutting for welding analysis. Easily operated.

OUT-OF-ROUND ATTACHMENT

For accurately cutting out-of-round pipe, maintaining interval between torch tip and out-of-round pipe insuring clean, accurate cut.

for SPEED, ACCURACY, DEPENDABILITY, SERVICE AND ECONOMY — IT'S MATHEY

C. A. Mathey MACHINE WORKS, INC.

212 SO. FRANKFORT TULSA, OKLA. • PHONE Diamond 3-3623

Original manufacturers and engineers of all Mathey type Pipe Cutting and Beveling machines.

(251) Revolutionary Gas Scrubber Design

One of the most advanced and revolutionary new methods for removal of liquid or solid particles from the gas flow in pipe lines is the all-new Peerless Scrubosphere.

The Scrubosphere is a spherical gas scrubber and is said to be one of the most efficient scrubbers of this type yet developed.

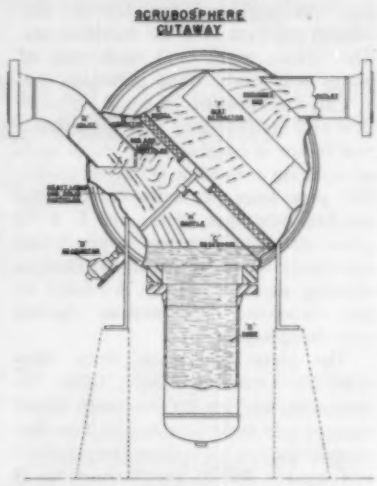
The accompanying line drawing of the scrubber will give an idea of how efficiently operates. The dirty incoming gas enters the vessel "A," where the heavier solid particles and a large amount of liquid are separated by being directed downward. The gas must then turn and rise to point where it flows through a wetted contractor or dust removal unit "B," which is revolved through a liquid reservoir "C" by a gear motor "D." This contractor, which consists of a maze of wires mounted on a revolving wheel "E," presents a tremendous number of closely spaced wetted surfaces in the path of the dirty gas, which provides the high efficiency of small particle removal.

Scrubosphere Capacities:

Flow Rates in MMSCF/Day of .69 gravity gas at 60F (Refers to Bulletin 180) PSIG

Type	−5	0	10	25	50	75	100	150	200
S48	8.1	10.1	12.9	16.5	21.1	24.7	28.0	33.8	38.3
S54	10.3	12.7	16.5	20.9	26.6	31.4	35.3	42.5	48.5
S60	14.0	17.2	22.3	28.2	36.0	42.4	47.8	57.6	65.6
S66	17.4	21.5	27.8	35.3	44.9	53.0	59.6	71.9	81.9
S72	22.5	27.7	35.7	45.5	57.9	68.2	77.0	92.6	106
S78	27.2	33.6	43.3	55.1	70.2	2.4	93.1	12	128
Type	300	400	500	600	700	800	900	1000	1200
S48	46.4	53.3	59.3	64.8	70.1	74.8	79.2	83.5	91.5
S54	58.6	67.4	75.1	82.2	88.7	94.5	100	106	116
S60	79.4	91.2	102	111	119	126	135	141	156
S66	99.1	113	127	139	151	159	169	179	195
S72	128	147	164	179	194	207	218	231	253
S78	155	179	198	217	234	249	264	279	306

These capacity ratings include a 20 percent safety factor. However, it is recommended that the units be operated within the ratings for best results.



Closely wetted surfaces of the contractor insure high efficiency of dust removal. Still there is no gas bubbling through liquid, which creates bubbles bursting into tiny droplets that often are carried out of vessels causing large liquid losses.

Any liquid blow off the back side of the contractor by the gas is removed by the Peerless Mist Extractor "F" and drains down into the reservoir. Most fluids coming into the vessel with the gas stream either fall directly into the reservoir "C" or end up there by draining off the contractor.

Peerless Manufacturing Company.

AN-SPEC

HIGHEST QUALITY MATERIALS

- COMPREHENSIVE SURVEYING
- EXPERIENCED ENGINEERING
- COMPLETE CONSTRUCTION

AN-SPEC magnesium anodes are spectrographically analyzed . . . high purity guaranteed. And Pipe Line Anode Corporation offers every service — by highly skilled personnel — for the most effective results. For complete cathodic protection from corrosion, call . . . AN-SPEC.

ANODE SPECIALISTS
AN-SPEC

PIPE LINE ANODE CORPORATION

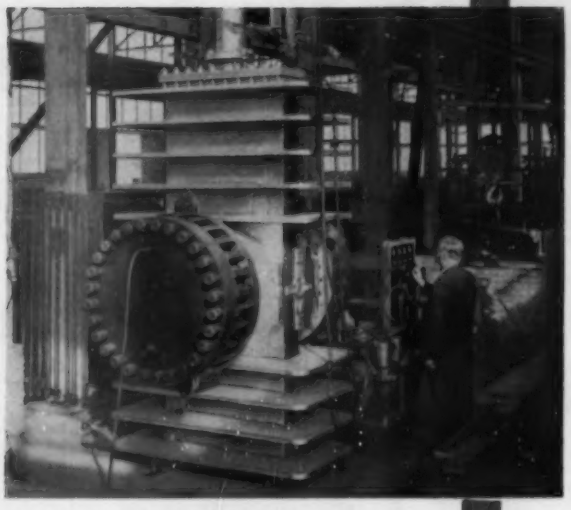
P. O. BOX 996 • TULSA, OKLAHOMA

2230 Magnolia Street, Birmingham, Alabama
11525 East Colfax, Denver (Aurora), Colorado
858 Wilson Avenue, Newark, New Jersey
912 West 11th, Houston, Texas

Distributor: Crose-Curran, Ltd., Edmonton, Alberta—Phone 3-5135

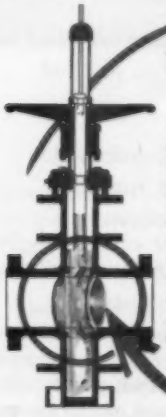
• *the fabricated steel gate valve that's*

DESIGNED BUILT TESTED PROVED *for* PIPELINE SERVICE



34" full opening gas line valve being tested before shipment for free gate movement, bubble-tight seal.

24" full opening valve being subjected to 600-ton compression load. Gate maintained free movement.



THE WHOLE VALVE IS RIGHT HERE

When valve is full open or closed, bubble-tight seals on both sides of the gate completely isolate line pressure in the conduit. The body, serving merely as framework for operating mechanism and to prevent loss of product while gate is in motion, may be drained or vented to atmosphere when gate is open or closed. Integrity of seals can be checked any time by a tell-tale valve on the body.

Engineered and built specifically for pipeline service, every Grove Seal-O-Ring fabricated steel body is tested at *double its rated working pressure*. This subjects it to tension far greater than anything it might be expected to face in the field—and at the same time relieves any existing stresses in the body itself.

To check effects of extreme compression, a Grove 24" valve was recently subjected to a *600-ton* compression load, without benefit of internal pressure to offset any of the tremendous force. The gate remained completely free to open and close!

The full-floating gate and seats can be depended upon to maintain bubble-tight seal with pressure in either direction, even under severe conditions of line compression or stress.

These test results have been confirmed by experience of hundreds of users—in gas and liquid service—under the most grueling operating conditions.

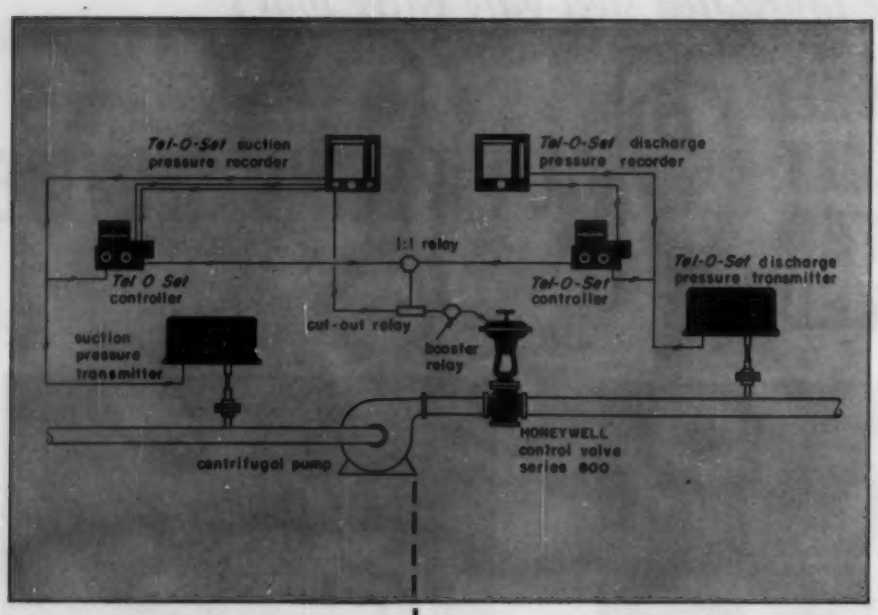
603

GROVE SEAL-"O"-RING Gate Valves

GROVE VALVE and REGULATOR COMPANY • 65th & Hollis Sts., Oakland 8, California
HOUSTON 4 — 1901 Calumet St. • • • • • • • • **LOS ANGELES 6** — 1930 W. Olympic Blvd.

ODESSA, TEXAS • TULSA, OKLAHOMA • DENVER, COLORADO • In Western Canada: GROVE VALVE LIMITED

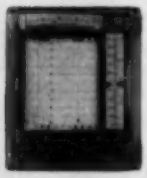
GROVE SEAL RING — GROVE — SIMPLICITY ACCURACY SAFETY



Typical *Tel-O-Set* instrumentation for a centrifugal pump uses a combination of transmitter, recorder and controller for both suction and discharge pressure. Systems are interlocked through a relay to operate a Honeywell Series 800 control valve.

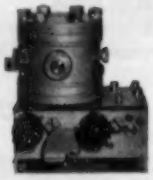
***Tel-O-Set* transmitter**

sends air signal to recorder. It's fast, accurate, compensated for changes in ambient temperature and pressure. Zero and span readily adjustable.



***Tel-O-Set* recorder**

is accurate, sensitive, compact. All adjustments made from front of panel. Complete chassis is replaceable . . . no loss of control. 30-day chart record.



***Tel-O-Set* controller**

has fast response, is unaffected by vibration. Disconnects at turn of a single switch. Each sub-assembly is a precalibrated unit, interchangeable in seconds.

FULL-TIME CONTROL

...For Pipeline Pumping Stations

Put a *Tel-O-Set* control system to work on your pumps—and you're sure of uninterrupted service. When instrument maintenance is needed, the job gets done in seconds.

The reason: transmitter, recorder and controller are designed with quickly interchangeable unit sections. You just put in a new, precalibrated unit when needed.

In performance, too, *Tel-O-Set* miniature instrumentation leads in every respect. It's accurate, sensitive, rugged. It's exceptionally easy to tune for peak operation.

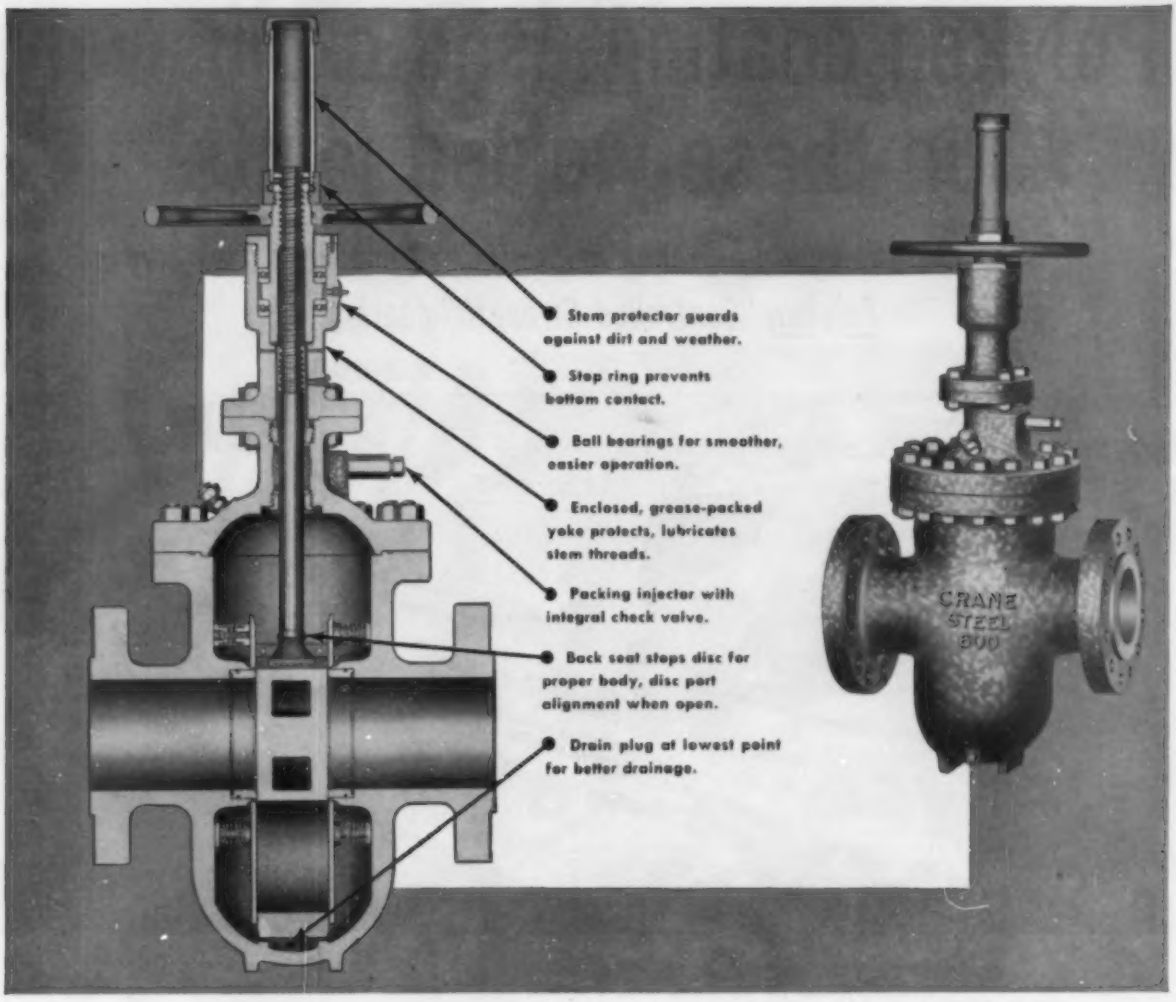
Find out from your local Honeywell sales engineer how *Tel-O-Set* instruments can be applied to your station. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa. —in Canada, Toronto 17, Ontario.

MINNEAPOLIS **Honeywell**

BROWN INSTRUMENTS

First in Controls


Stem protector guards against dirt and weather.
Stop ring prevents bottom contact.
Ball bearings for smoother, easier operation.
Enclosed, grease-packed yoke protects, lubricates stem threads.
Packing injector with integral check valve.
Back seat stops disc for proper body, disc port alignment when open.
Drain plug at lowest point for better drainage.
CRANE
STEEL
800

New Crane conduit pipeline valve designed to save you trouble

Extensive field tests—under severest operating conditions—have already proved that this new Crane Pipeline Gate Valve can save you trouble on your pipeline services.

Its simple one-piece disc design—a Crane exclusive—gives this conduit-type valve non-directional flow—parallel seat faces provide tight seating at the outlet, eliminating need for excessive stem loading—line pressure does the work. There's no complex disc construction to cause sticking in operation. Self-aligning body seat rings can be slipped in and out by hand quickly and easily—more savings on maintenance.

Another feature you'll like is self-sealing seating. After closure, the upsteam pressure—acting on an area back of the seat ring which is greater than the area in contact with the disc—creates a differential pressure for absolutely tight seating. You'll also like the straight, smooth, turbulence-free conduit design . . . the spring-loaded disc plates that keep dirt out and grease in . . . the pressure-relieved body bonnet chamber . . . the trouble-free stuffing box with plastic packing . . . and the pressure-tight body bonnet joint.

You can order these new Crane Single-Disc Conduit Pipeline Gate Valves now in sizes 2 to 30 inch either straight-way or venturi type—both with spur or bevel gearing, if desired. For complete information, see your local Crane Representative, or write to address below.

CRANE VALVES & FITTINGS

PIPE • KITCHENS • PLUMBING • HEATING

Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

Polyken coating used exclusively on these welded joints

Why the Albuquerque branch of Southern Union Gas uses only Polyken "Controlled Strength" coating

Quick work . . . lasting protection. Southern Union Gas crewman wraps welded joints in the field with *Polyken* Polyethylene Tape No. 900.

***Polyken* Tape** fills the prescription here for the Southern Union Gas Company. The installation: service lines carrying natural gas to a development of new homes.

Mill-coated pipe is welded and the joint hand wrapped on the site. This method is far faster and cheaper than former methods.

Further advantages of *Polyken* Polyethylene Tape: easy to handle; compact in transportation and storage; simply applied; tough, durable, fast-sticking and secure; just the right stretch to conform to joints and caps. (That's what we mean by "Controlled Strength": the right combination of backing and adhesive to give you "all work—no waste".)

Want to figure application costs on your job? Let's sit down and work them out. Write, wire or phone today: The Kendall Company, *Polyken* Sales Division, Dept. PE-G, 222 West Adams Street, Chicago 6, Illinois (RAndolph 6-4250).

Complete catalog, Sweet's Industrial Construction File, Sec. 9c/Ke

Polyken®

CONTROLLED STRENGTH

PROTECTIVE COATINGS

THE KENDALL COMPANY, POLYKEN SALES DIVISION

THE E.I.M. FIREMEN

All E.I.M. Installations of This Type Conform With "Emergency Shutdown Facilities" (No. B43.431 Section 8, ASA B31.18-1955)

EVERYWHERE AND ANY TIME THERE'S A FIRE EMERGENCY— YOU'LL FIND THE G-2 CONTROLLING THE SITUATION

EIM G-2 valve controls guide the flow of gas through compressers where the pressure is increased.

With a breach in the line there comes a marked reduction in pressure which, within a matter of seconds, automatically closes the G-2 valve control and re-routes the gas through an undamaged line. In addition to this, a vent valve in the affected area is opened sending a jet of gas from the damaged line spewing harmlessly into the air, thus reducing fire losses to a minimum.

G-2 valve controls stand watch twenty-four hours a day in silent protection of life, limb, property, and our valuable natural resources.

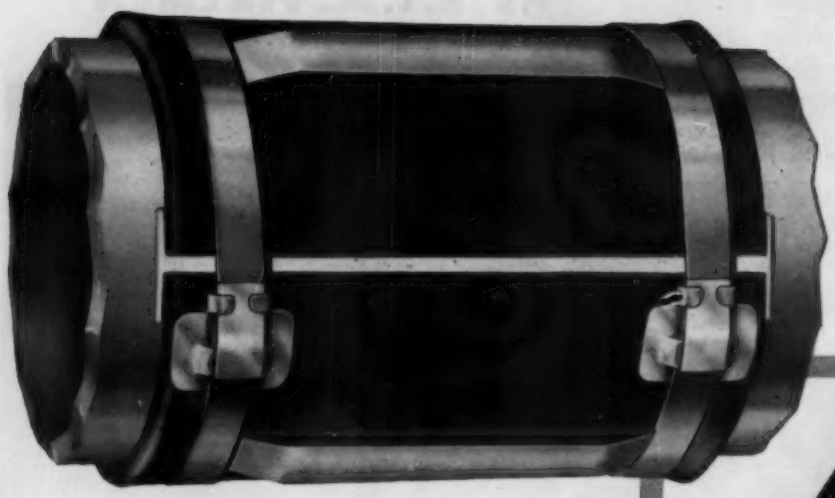
E-I-M Company
INCORPORATED

1340 OLD SPANISH TRAIL
HOUSTON 25, TEXAS • MOhawk 4-4587

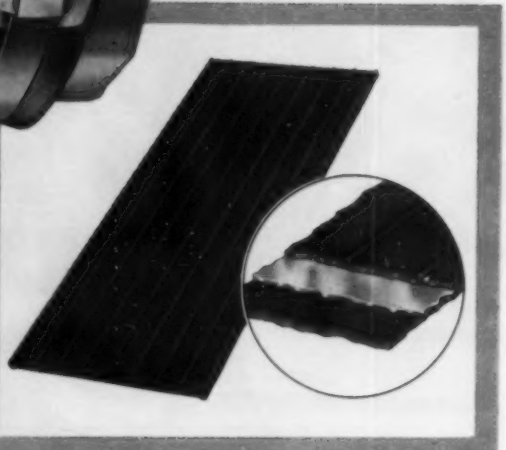
Valve Controls • Speed Reducers
Cooling Tower Drives • Control Valves

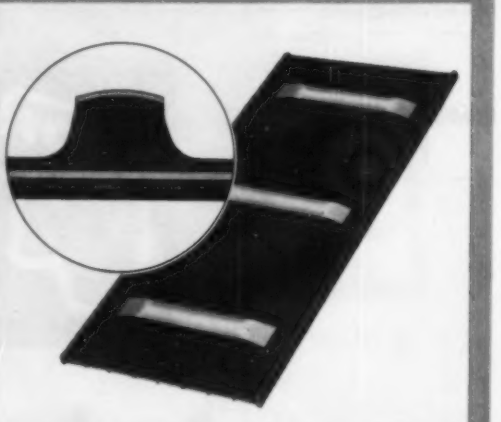
AT LAST...A REAL INSULATOR

for the tight jobs



2" through 12"





The "Maloney Model 56" Casing Insulator

Manufactured with Neoprene, which is vulcanized to the steel band core and to the rounded steel runners, there is no place to "short-out" between the casing and the carrier line. The steel core is completely surrounded with Neoprene and is bonded under heat and pressure to give the same strength as on army tank tread blocks.

Shipped flat, the Insulator is easily field formed and banded to the carrier pipe with stainless steel bands. Joint is sealed with a Polyethylene band.

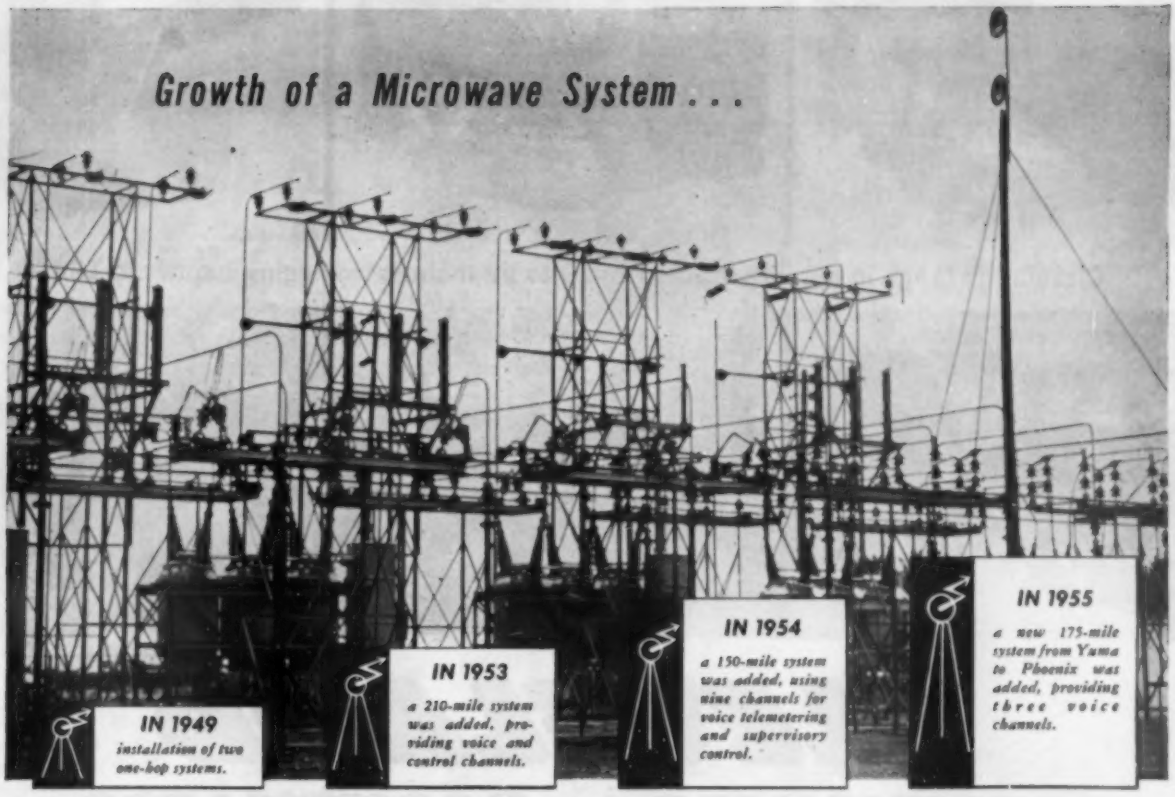
Manufactured in sizes from 2" through 12", it can be used either on installations where there is only one nominal pipe size difference or on installations having a larger differential.

SINCE 1932 —
PRECISION IN RUBBER —
METAL — PLASTICS

"Something from the Irishman"

F. H. MALONEY
Company

2301 TEXAS AVE. • FA 3-3161 • HOUSTON


Growth of a Microwave System . . .
IN 1949
installation of two one-hop systems.
IN 1953
a 210-mile system was added, providing voice and control channels.
IN 1954
a 150-mile system was added, using nine channels for voice telemetering and supervisory control.
IN 1955
a new 175-mile system from Yuma to Phoenix was added, providing three voice channels.

They Chose RCA Microwave Every Time Because of Its DEPENDABILITY

. . . for growing multi-station system at Arizona Public Service Co.

The original installation at Arizona Public Service Company in 1949 consisted of two RCA one-hop systems used to control unattended substations from the central steam-electric plant at Phoenix. Additional RCA systems were installed in 1953 and 1954, and again in 1955.

This steady growth with RCA Microwave—to the present multi-hop system—attests to its proven performance under the most trying conditions . . . including ambient 140 degree heat, high winds, severe electric and dust storms and violent rains.

Here also is proof of its ease of adaptability to future requirements. Through the years the dependability of this equipment has been virtually 100%. Completely independent of the transmission lines it services, it provides unfailing communications and control when needed most.

You can be sure of your microwave system's dependability if you first seek the advice of microwave engineers at RCA . . . world leader in radio and electronics. RCA equipment uses easy-to-service, familiar circuits and readily available tubes. It can interconnect with existing telephone lines, switchboards and mobile radio installations. Only RCA Microwave systems provide so many advanced engineering features. Get complete data.

RCA Microwave Specialists will be glad to answer any questions and help plan your installation. Mail coupon for further particulars on use of Microwave in utilities, pipelines, turnpike and other applications.

RCA MICROWAVE

POINT-TO-POINT COMMUNICATION

Performance proved in more than a million channel miles of operating systems throughout the world.

RADIO CORPORATION of AMERICA
COMMUNICATIONS PRODUCTS
CAMDEN, N.J.

Radio Corporation of America
Communications Products, Dept. GC-127, Building 15-1, Camden, N. J.

☐ Please send me latest literature on RCA Microwave.

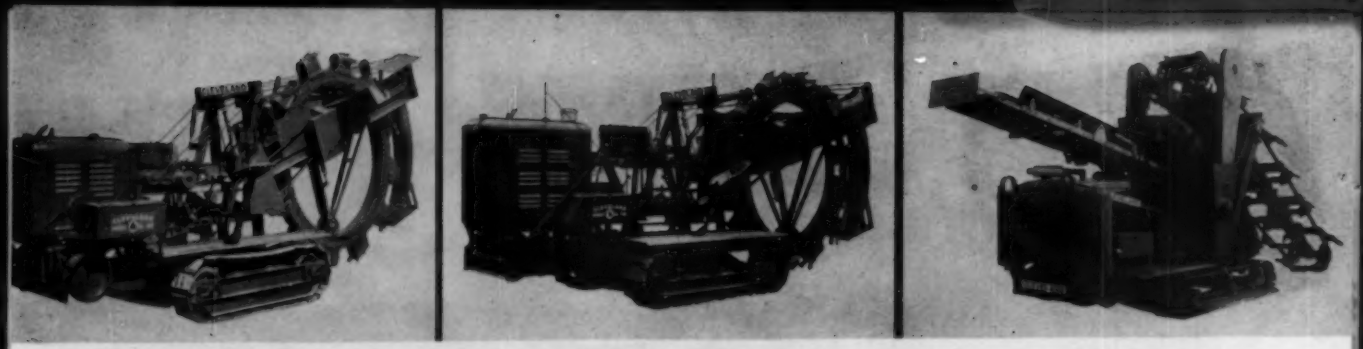
NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

☐ Have an RCA representative get in touch with me.



Clevelands range in digging widths from 9 to 52 inches; in digging depths to 18 feet.

CLEVELAND.

TRENCHERS and BACKFILLERS

Cleveland Backfillers are excellent sidecranes too; smaller models are available with or without tamper unit.

Good Everywhere

THE CLEVELAND TRENCHER COMPANY

20100 St. Clair Avenue • Cleveland 17, Ohio

Do You Know

What Topaz Can Do For You?

Topaz is a sales and service organization offering you complete lines of nationally recognized pipeline supplies and equipment plus the consulting and supervisory services of experienced engineers. You can call Topaz night or day, with assurance that your needs will receive prompt personal attention.

Hot Tapping

Topaz* sales engineers plan and supervise** hot tapping operations on gas, steam, water, products and chemical lines without costly shutdown. Hot tapping equipment may be contracted, leased or purchased. Topaz service includes consultation, supervision and instruction of company field personnel on use of purchased equipment.

*Agent for T. D. Williamson, Inc.
**In Cooperation with T. D. Williamson, Inc.

L & M Marker-Vents

L & M Marker-vents on highway and railroad casing vent pipes have proved both effective and economical. Less expensive than a field-welded vent hood, the aluminum alloy L & M Marker-vent will last the life of the line. Custom designed sign panels with your company name and emblem are available in your choice of colors. Sizes available for 2", 3" and 4" pipe. L & M products, distributed by Topaz* also include standard safety signs, well markers and aerial view markers.

*Sole distributor for L & M products.

Consulting, Engineering and Supervision

Working in cooperation with engineering departments, Topaz sales engineers perform flow condition analyses, pigging, stopple application, inspection and line testing. All equipment for these operations may be leased, contracted or purchased through Topaz.

Cathodic Protection

All cathodic protection equipment and supplies, including rectifiers, anodes, coke breeze, pipe wrap and pipe coatings are available from one supplier . . . Topaz*. This means savings to you in time and paper work.

*Agent for The Holcombe Co., Inc.

Other supplies available from Topaz:

- valves
- pipe cutting machines
- cutting and beveling machines
- odorizers
- clamps, hooks and dollies
- pipe saddles and reducers
- heavy machines
- torches
- Plus all other equipment or supplies necessary to complete your project.

Tod Pazdral *Pipeline Specialties*

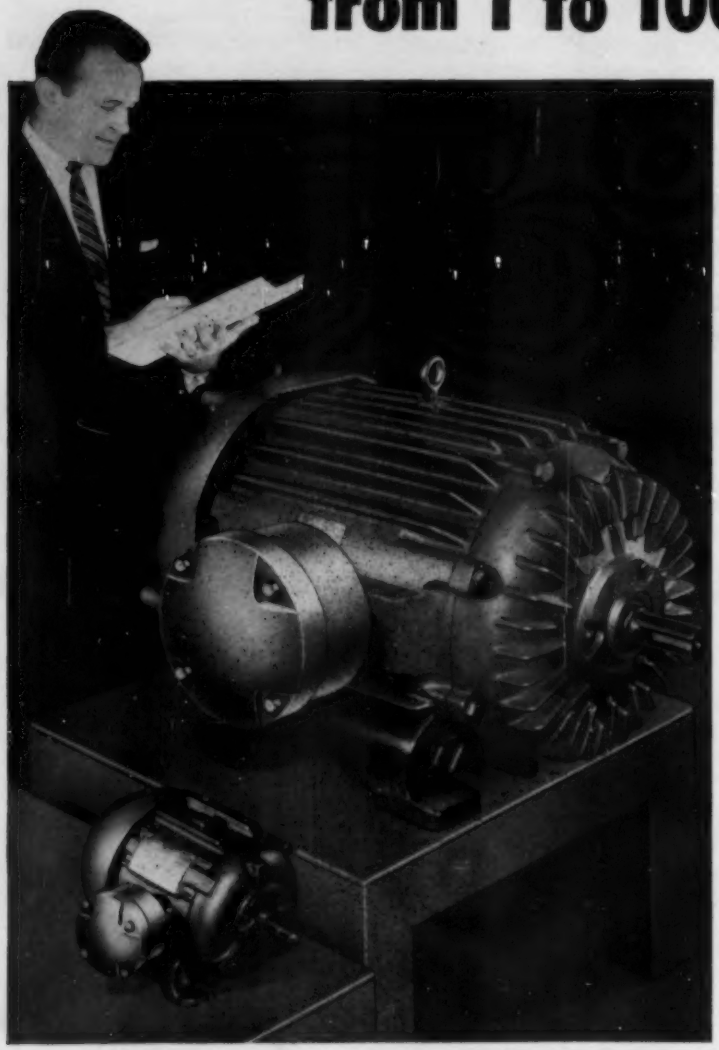
TOPAZ

2525 South Boulevard Houston, Texas Office Phone: JA 2-1403
Tod Pazdral Consulting and Supervision Home Phone: MA 3-5680

There's **MORE** rating selection available in Allis-Chalmers **MOTORS**

To meet refinery needs...

Allis-Chalmers Offers Complete Line of Rib-Type MOTORS from 1 to 100 Hp



Allis-Chalmers, a pioneer in rib-type TEFC motor design, is the only leading manufacturer offering a complete line of these motors from 1 to 100 hp. The many cost-saving features of deep-rib construction can be applied in a variety of uses... both indoors and out.

Here's why these motors can cut refinery costs:

MORE cooling surface — Rib-type design provides reserve cooling capacity in dirty locations.

MORE iron—Cast-iron frame and external parts assure rigidity and resistance to corrosion.

MORE copper — Allis-Chalmers greater use of copper increases electrical life.

MORE lubrication provisions — Large grease reservoirs surround bearings. Provision made for in-service relubrication — important where moisture or corrosive vapors contaminate grease.

As a new machinery component or as replacement, specify Allis-Chalmers. To find out more, contact your nearby Allis-Chalmers distributor, district office, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

A-4963

ALLIS-CHALMERS

How perfectly simple —this Fast's Coupling with purely mechanical flexibility!

1. A hub is keyed on each shaft. Hubs are splined at maximum distance from shaft ends.
2. Floating sleeves surround hubs. Sleeves are splined to engage hub splines.
3. Sleeves compensate for shaft misalignment by assuming neutral position between two hubs.
4. Because of distance from shaft end, any misalignment between splines is mere fraction of same misalignment between shafts.
5. Sleeves carried on bearing rings, located on transverse center line of hub spline faces (the load-carrying surfaces) . . . no crank action, no vibration.
6. Lubricant is centrifugally forced into spaces between engaged splines, forming a film.

For 35 years the most positive, dependable means of coupling machines to their power source . . . Fast's Couplings have no parts subject to repeated bending, tension or compression. Because there is no metal-to-metal contact, *there is no wear*—in fact, many Fast's Couplings in use for over 30 years show no signs of wear when disassembled! No leather, plastic or rubber oil seals. Lubricant film distributes pressure over a considerable area, diminishing localized stress at pressure points on the load-carrying teeth. Perfectly simple? Yes . . . and foolproof!

For coupling catalog, technical advice or assistance from Koppers field engineers, write: KOPPERS COMPANY, INC., *Fast's Coupling Dept.,* 3207 Scott Street, Baltimore 3, Maryland.

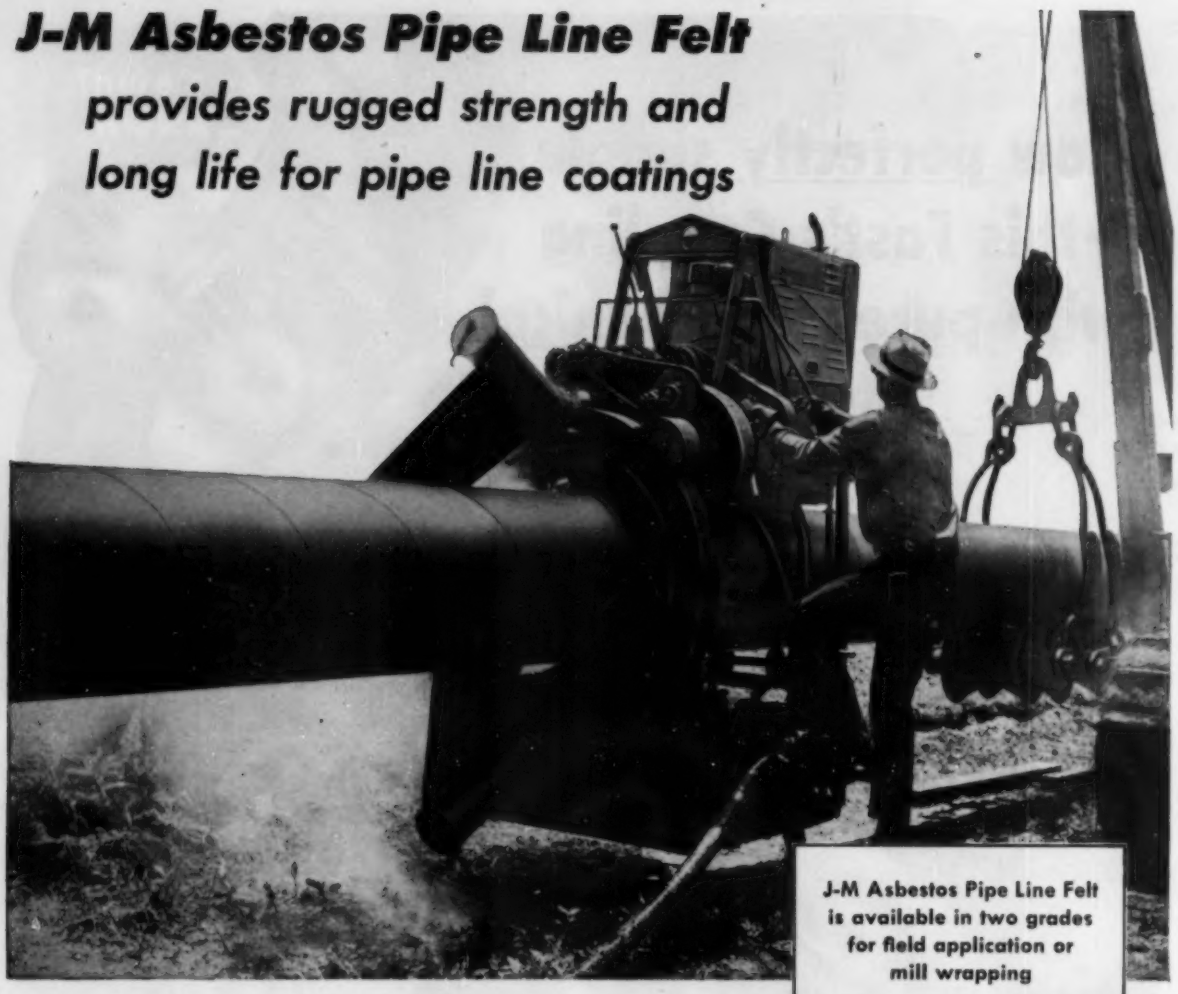
THE ORIGINAL **FAST'S Couplings**

KOPPERS

METAL PRODUCTS DIVISION • KOPPERS COMPANY, INC. • BALTIMORE 3, MD.
This Koppers Division also supplies industry with American Hammered Industrial Piston and Sealing Rings, Industrial Gas Cleaning Apparatus, Aeromaster Fans.
Engineered Products Sold with Service.

J-M Asbestos Pipe Line Felt

provides rugged strength and long life for pipe line coatings



Permits high-speed wrapping and effective protection for enamels

Johns-Manville Asbestos Felt gives pipe line coatings the rugged strength that is needed to guard the enamel from years of soil action. It forms a *stable* coating to reduce the hazards of pipe line corrosion leaks and provides a sound foundation when cathodic protection is used. Inorganic asbestos felt is the only wrapper that has survived more than half a century of actual service conditions in all types of soils.

J-M Asbestos Pipe Line Felt acts as a continuous sheath over the enamel... guarding the coating from the effect of the shifting grip of the soil as it expands and contracts due to alternate wetting and drying. It resists the destructive action of bacteria, fungi and soil chemicals, thus assuring long life to pipe line coatings.

J-M Asbestos Pipe Line Felt is available in two grades for field application or mill wrapping

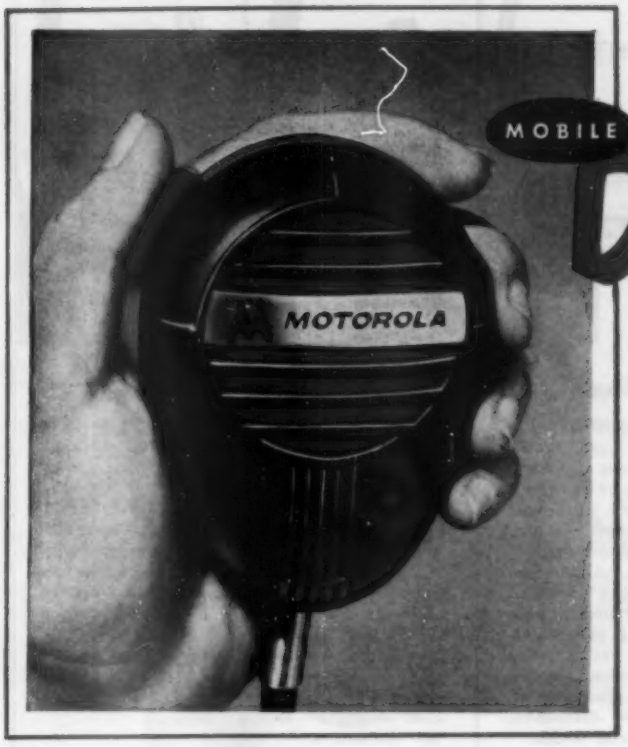
Transhield Asbestos Pipe Line Felt—for average soil conditions.

#15 Asbestos Pipe Line Felt—heavy-duty material for severe soil conditions where a heavier material is desired.

For further information about Johns-Manville Products for Pipe Line Protection, write to Johns-Manville, Box 60, New York 16, N. Y., in Canada, Port Credit, Ontario.

Johns-Manville **ASBESTOS FELT FOR PIPE LINE PROTECTION**

an important new "PLUS FACTOR" of the Motorola Twin-V Radiophone



MOBILE

TRANSISTORIZED DYNAMIC MICROPHONE

Unprecedented voice clarity for mobile radio transmission

- true moving coil dynamic characteristics
- transistor preamplifier built-in
- printed circuit
- all-metal housing
- retains popular size and shape
- superior voice reproduction
- unexcelled reliability.

Twin-V

The new transistorized dynamic microphone, or the dual purpose dynamic "Speaker-Mike," is *optionally* available with Motorola's "TWIN-V" Radiophone—the world's finest FM 2-way mobile radio unit . . . incorporating many *exclusive* features, including universal 6/12 volt operation, Sensicon receiver, Permakay Filter, and Instantaneous Deviation Control.

Motorola's new transistorized dynamic microphone provides *mobile* transmission quality comparable to that of the base station. Unexcelled voice clarity, crispness, and intelligibility are yours in this newest Motorola *first*.

Also available as *"SPEAKER-MIKE"*

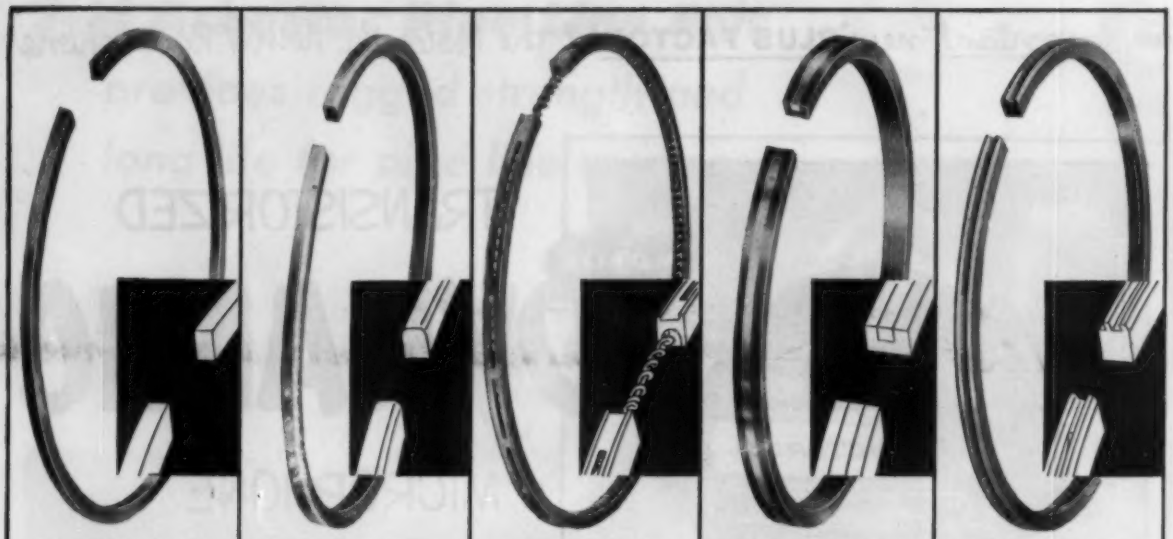
The new microphone can be furnished as a dual-purpose "Speaker-Mike" which functions as a full output communications-type *loudspeaker*, as well as a dynamic microphone. It can be conveniently mounted, or held near the operator's ear to overcome high ambient noise levels.

You can have either of these outstanding microphones as replacement items, or as *optional* equipment with new Motorola "TWIN-V" Radiophones. The transistorized, dynamic microphone, with its *popular palm size*, is directly interchangeable with Motorola carbon models now in use. The "Speaker-Mike" version requires a simple modification kit for replacement use in existing equipment.

Immediately available. Write, phone or wire today, or contact your local Motorola Radio Communications Engineer.

MOTOROLA COMMUNICATIONS & ELECTRONICS, INC.

A SUBSIDIARY OF MOTOROLA, INC., 4501 AUGUSTA BOULEVARD, CHICAGO 51, ILLINOIS



COMPRESSION RING . . . 1-piece, quick-seating. Maximum strength. Turned finish on outside diameter lets ring conform readily to the cylinder bore. The chemically treated surfaces aid rapid seating, no scuffing or scoring during run-in. ½" to 120" diameters.

POROUS CHROME PLATED RING . . . exclusive Van der Horst process. Shallow porosity on cylinder contacting surface facilitates break-in, holds and distributes oil during this critical period. Lasts four times longer, cuts cylinder wear up to 75%. ½" to 42" diameters.

CONFORMABLE OIL RING . . . maintains constant pressure for positive oil control. Conforms to meet cylinder distortion; flexible cast iron member, pressed outward by abutment type spring exerts uniform radial pressure around entire circumference. 4" to 25" diameters, ¼" min. width.

KOPPERS SEAL RING . . . has one or two projecting bands of bearing bronze inserted in contacting face. Very quick-seating. Tends to prevent blow-by in new or worn cylinders. The burnishing action of bronze on cylinder walls decreases scuffing and wear. 2" to 30" diameters.

GROOVED OIL CUTTER RING...valuable where oil control is a major problem. Two bevels for riding over oil on up-stroke, two scraping edges for removing excess oil from walls on downstroke, plus a series of wide drainage slots. 1½" to 25" diameters.

Five Koppers Rings . . . worth their weight in gold!

What will American Hammered Industrial Piston Rings *do for you?* They'll save you money on fuel, on lubricating oil, on labor costs—by reducing down-time.

They'll maintain high compression, improve your operation, give you *much* longer service. They don't cost much . . . but they have over 35 years of manufacturing skill and accumulated experience behind them. They never let you down, they never fail in the jobs they're designed to do—and hundreds of satisfied users will tell you that, despite their low cost, Koppers rings *are* worth their weight in gold.

American Hammered Piston Rings are available in all types, all sizes—from ½" to 10' diameter—for every purpose. Koppers makes American Hammered Rings for all kinds of industrial equipment, can recommend without bias as to types. It costs nothing to consult Koppers—for illustrated Piston Ring booklet write to KOPPERS COMPANY, INC., *Piston Ring & Seal Dept.,* 1707 Hamburg Street, Baltimore 3, Md.

METAL PRODUCTS DIVISION • KOPPERS COMPANY, INC. • Baltimore 3, Maryland
This Koppers Division also supplies industry with Post's Couplings, Industrial Gas Cleaning Apparatus, Aeromaster Fans, Gas Apparatus.
Engineered Products Sold with *Service*

KOPPERS®

AMERICAN HAMMERED
Industrial Piston Rings

These are the 4 big reasons why operators get better service from LANE-WELLS PACKERS

1 LONGER LIFE

2 EASY PULLING

3 LEAK-PROOF PACKOFF

4 POSITIVE SETTING

And here are a few of the design and construction features which give these 4 big values:

SLYDEZE dovetailed slips which can't catch or hang up the packer, and don't "freeze" to the cone.

CROSS-CUT wickers which hold firm on hardest casing, without harming the casing.

CONTROLLED-EXPANSION sealing element which springs back to shape upon release, and doesn't "vulcanize" to the casing.

LIFTING LUGS which insure release of the sealing element.

LARGE BY-PASS (in valve-type packers) which gives fast running in fluid.

FULL-DIAMETER mandrel which allows free passage of tools.

Tomorrow's Tools Today!

There's a LANE-WELLS PACKER "tailor-made" to fit *your job—write for complete information.*

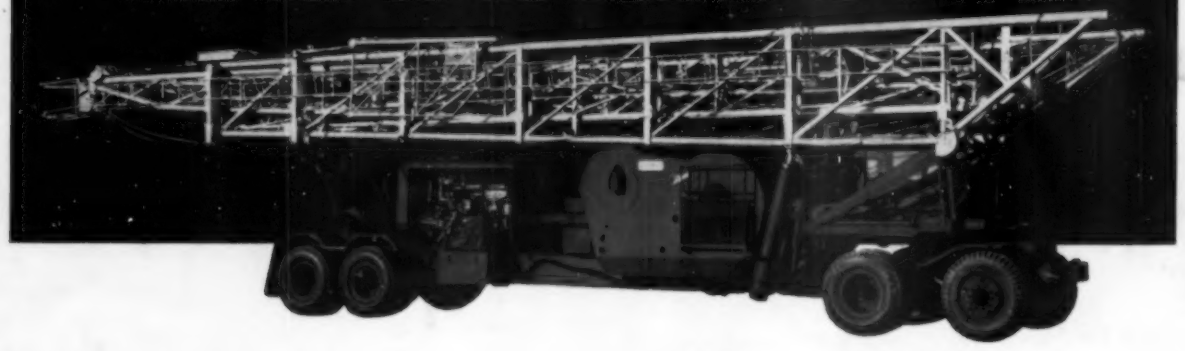
LANE WELLS COMPANY

GENERAL OFFICES, EXPORT OFFICE, PLANT • 5610 SO. SOTO ST., LOS ANGELES 58

Los Angeles • Houston • Oklahoma City • Lane-Wells Canadian Co. in Canada • Petro-Tech Service Co. in Venezuela

DESIGNED FOR WELL SERVICING

...AS FAST ON THE HIGHWAY AS A TRUCK



FRANKS *Clipper*

The Franks Clipper is a unit basically built for servicing – the main job of the unit – but which is also self-propelled, using the drawworks motor for road power.

One feature is that the Clipper heads into location making "spotting" much quicker and easier. The use of outriggers makes the unit more stable and assures operation without ground guylines.

The Clipper moves completely strung-up and is the fastest location-to-location unit, rig-up and rig-down unit on the market. Franks unit is fully field tested. It will pay you to look at a Clipper before you buy.

FRANKS DIVISION
Cabot Shops, Inc.
Box 3218, Whittier Station
TULSA, OKLAHOMA

A DIVISION OF CABOT SHOPS, INC.

FRANKS
DIVISION CABOT SHOPS INC.
WELL SERVICING AND DRILLING UNITS
TULSA, OKLAHOMA

"ON THE SPOT" FIELD SERVICE